Výrobky nízkého napětí

Kabelové proudové transformátory typy: KOLMA, KOLA, KOKM, KORI, KOLT

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Obsah

Transformátory pro měření zbytkového proudu typy KOLMA, KOLA

Kabelové proudové transformátory KOLMA_ a KOLA_ slouží k měření součtu 3-fázových proudů v 3-fázovém kabelu.
Za normálních provozních podmínek je tento součet nulový.
V případě zemního spojení je roven poruchovému zemnímu proudu a odpovídajícímu toku proudu v sekundárním vinutí.
Tyto typy transformátorů se používají společně se statickými relé zemního spojení a kromě měření zbytkových proudů je lze použít například pro upozornění na zemní spojení nebo pro jeho lokalizaci.
Jako primární vodič slouží přípojnice nebo kabel.

Jak vybrat správné transformátory zbytkového proudu

Transformátor pro relé zemního spojení se vybírá podle velikosti okna a konstrukce transformátoru.
Počet závitů sekundárního vinutí u typů KOLMA 06 A1 a KOLMA 06 D1 se volí podle hodnoty nastavení relé a poruchového zemního proudu nebo požadovaného poměru proudů. Správnou funkci ochrany proti zemnímu spojení u typů KOLMA 06 A1 a KOLMA 06 D1 lze také snadno ověřit pomocí zkušebního vinutí transformátoru (svorky P1x - P2x). Zkušební vinutí je dimenzováno na maximální trvalý proud 6 A.

Tabulka 1. Výběr transformátorů zbytkového proudu

Typ	Průměr okna [mm]	Konstrukce	Hmotnost [kg]
KOLMA 06 A1	90	Kruhové jádro, sekundár s více odbočkami	7,0
KOLMA 06 A2	58	Kruhové jádro	2,9
KOLMA 06 B2	100	Kruhové jádro	5,4
KOLMA 06 D1	180	Kruhové jádro, sekundár s více odbočkami	11,5
KOLMA 06 D2	180	Kruhové jádro	11,4
KOLA 06 B2	100	Dělené kruhové jádro	6,0
KOLA 06 D2	180	Dělené kruhové jádro	11,0

Tabulka 2. Technická data

Jmenovité napětí	0,72 kV (1)
Zkušební napětí izolace 50 Hz 1 min	3 kV (IEC 60044-1)
Kmitočet	50 Hz (60 Hz)
Jmenovitý tepelný proud	1,2 x I_{pn}
Krátkodobý výdržný proud I_{th} 1 s	60 x I_{pn} (2)
Dynamický výdržný proud I_{dyn}	2,5 x I_{th}
Sekundární svorky	pro vodič 6 mm^2
Rozsah provozní teploty	–25 ... +40 °C
Soulad s normami	IEC 60044-1

(1) Izolační hladina primárního vodiče určuje maximální provozní napětí.
(2) KOLA 06 B2 je typově zkoušen na 10 kA 3 s.

Primárním vinutím kabelových proudových transformátorů vnitřního typu je buď kabel nebo přípojnice s izolací na použité napětí.
Sekundární vinutí a kruhové železné jádro je zalito v pryskyřici, což zajišťuje dobré elektrické a mechanické vlastnosti.

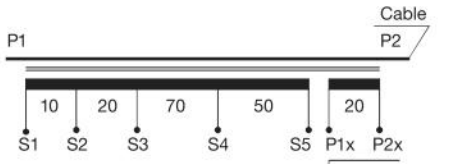
Montáž

Transformátory typu KOLMA se musí instalovat před zapojením kabelů a kabelových koncovek.
U typů KOLA 06 B2 a KOLA 06 D2 může být kruhové jádro otevřeno a transformátor nainstalován i v případě již zapojeného kabelu.
Obě poloviny kruhového jádra jsou sešroubovány čtyřmi šrouby, které slouží i k jejich zavedení do správné polohy. Sekundární vinutí je rozloženo na obou polovinách jádra. Obě části vinutí jsou spojeny dvěma spojovacími prvky.
Kabelové proudové transformátory jsou upevněny buď pomocí upevňovací podložky, nebo pomocí matek zalitých do rámu transformátoru. Při montáži transformátoru je nutno eliminovat účinek

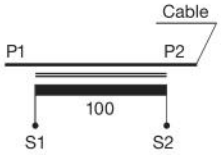
proudu na kovové armatuře nebo v ochranném vodiči. Pokud kovová armatura nebo ochranný vodič vedou skrz transformátor, musí být opačným směrem skrz transformátor veden uzemňovací vodič. Uzemňovací vodič mezi kabelovou svorkovnicí a transformátorem nesmí být připojen k vodivým částem a kovová kabelová svorkovnice musí být izolována od nosných konstrukcí. U transformátorů s volitelným převodovým poměrem nesmí dojít ke zkratu nezapojených svorek sekundárního vinutí a zkušebního vinutí.

Počet závitů a značení svorek

KOLMA 06 A1
KOLMA 06 D1



KOLMA 06 A2
KOLMA 06 B2
KOLMA 06 D2
KOLA 06 B2
KOLA 06 D2



Tabulka 3. Poměry proudů a jmenovitá zátěž pro třídu přesnosti 10P10

Proudový poměr [A]	Sekundární svorky	Zátěž/VA Typ KOLMA 06 A1	KOLMA 06 D1
50/1	S4 - S5	1,0	0,5
70/1	S3 - S4	2,0	1,0
100/1	S1 - S4	2,5	2,0
150/1	S1 - S5	5,0	4,0
50/5	S1 - S2	1,0	0,5
100/5	S2 - S3	2,5	1,5
150/5	S1 - S3	4,0	3,0
250/5	S4 - S5	7,5	5,0
350/5	S3 - S4	10,0	7,5
500/5	S1 - S4	15	10
600/5	S3 - S5	20	15
750/5	S1 - S5	20	15

Otevíratelné transformátory zbytkového proudu, typ (KOLA 06 B2), v sadě s upevňovací podložkou KOLMA-ZK 1 a krytem svorek KOK-ZAX 14.

Tabulka 4. Standardní technické parametry typů KOLMA_ a KOLA_

Typ	Primární proud [A]	Sekundární proud [A]	Třída přesnosti [A]	Zátěž [VA]	Rozměry		
					vnitřní [mm]	vnější [mm]	výška [mm]
KOLMA 06 A2	100	1	10P10	2	58	140	65
KOLMA 06 B2	100	1	10P10	2	100	196	65
KOLMA 06 D2	100	1	10P10	2	180	270	80
KOLA 06 B2	50	1	10P10	0,5	100	228	85
KOLA 06 B2	100	1	10P10	2	100	228	85
KOLA 06 B2	200	1	10P10	4	100	228	85
KOLA 06 B2	200	5	10P10	4	100	228	85
KOLA 06 B2	400	5	5P10	5	100	228	85
KOLA 06 B2	500	5	5P20	2,5	100	228	85
KOLA 06 B2	600	1	10P10	2	100	228	85
KOLA 06 B2	1 250	1	5P20	5	100	228	85
KOLA 06 B2	1 500	1	5P10	2,5	100	228	85
KOLA 06 B2	1 600	5	1	20	100	228	85
KOLA 06 D2	50	1	10P10	0,5	180	315	85
KOLA 06 D2	100	1	10P10	2	180	315	85
KOLA 06 D2	150	1	10P10	2	180	315	85
KOLA 06 D2	200	1	10P10	5	180	315	85
KOLA 06 D2	200	5	10P10	2	180	315	85
KOLA 06 D2	300	1	10P10	5	180	315	85
KOLA 06 D2	400	1	10P10	5	180	315	85
KOLA 06 D2	400	5	5P10	5	180	315	85
KOLA 06 D2	1 000	1	5P10	10	180	315	85
KOLA 06 D2	1 800	5	1	20	180	315	85
KOLA 06 J2	50	1	10P10	0,5	300 x 497	410 x 610	90
KOLA 06 J2	100	1	10P10	1	300 x 497	410 x 610	90
KOLA 06 J2	1 250	1	5P20	5	300 x 497	410 x 610	90
KOLA 06 J2	1 250	5	10P10	1	300 x 497	410 x 610	90

V případě požadavků na jiné elektrické parametry, než jsou uvedeny v tabulkách, se prosím obraťte na naše prodejní oddělení.

Tabulka 5. Výběr příslušenství pro transformátory KOLMA_ a KOLA_

Popis příslušenství	Typ	Určeno pro použití s transformátorem
Upevňovací podložka	KOLMA-ZK 1	KOLMA 06 A1
Upevňovací podložka	KOLMA-ZK 1	KOLMA 06 A2
Upevňovací podložka	KOLMA-ZK 1	KOLMA 06 B2
Upevňovací podložka	KOLMA-ZK 1	KOLA 06 B2
Upevňovací podložka	KOLMA-ZK 2	KOLMA 06 D1
Upevňovací podložka	KOLMA-ZK 2	KOLMA 06 D2
Upevňovací podložka	KOLMA-ZK 2	KOLA 06 D2
Kryt svorek sekundáru	KOK-ZAX 14	KOLMA 06 A2
Kryt svorek sekundáru	KOK-ZAX 14	KOLMA 06 B2
Kryt svorek sekundáru	KOK-ZAX 14	KOLA 06 B2
Kryt svorek sekundáru	KOK-ZAX 14	KOLA 06 D2

Záruka

Záruka je poskytována po dobu dvou let ode dne zahájení provozu transformátoru. Maximálně však po dobu tří let od zakoupení. Záruka se týká pouze výrobních vad a nevztahuje se na závady vzniklé v důsledku:

- nevhodné dopravy
- nesprávného skladování
- nedodržení pokynů během montáže a provozu
- nesprávného výběru transformátoru pro danou elektrickou soustavu.

Objednací údaje

Objednávka by měla obsahovat následující údaje:

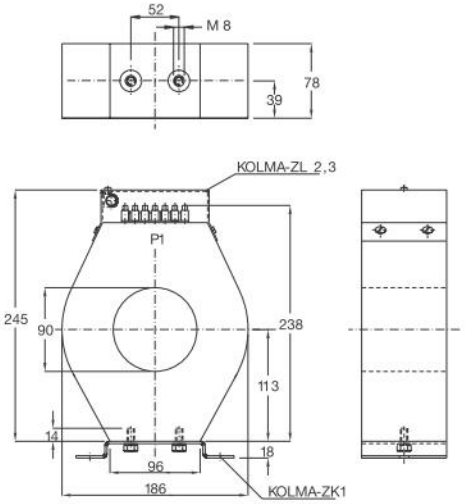
- typ proudového transformátoru
- jmenovitý primární proud/jmenovitý sekundární proud [A/A]
- jmenovitou zátěž a třídu přesnosti pro každé vinutí [VA]
- krátkodobý tepelný proud I_{th}
- normu
- množství

Příklad objednávky

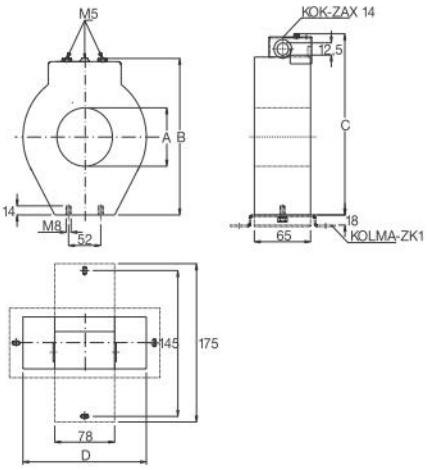
KOLA 06 B2; 100/1 A/A; 2 VA; 10P10; I_{th} = 60xI_{pn}/1s; IEC 60044-1; 12 ks.

Celkové rozměry

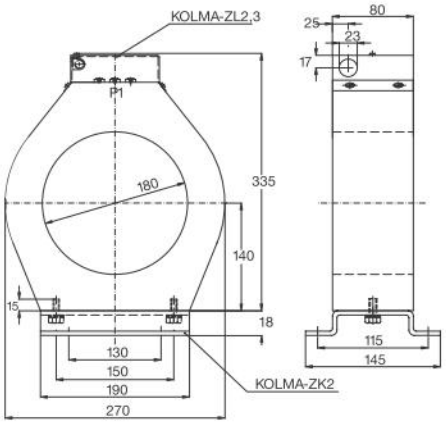
KOLMA 06 A1



KOLMA 06 A2, B2

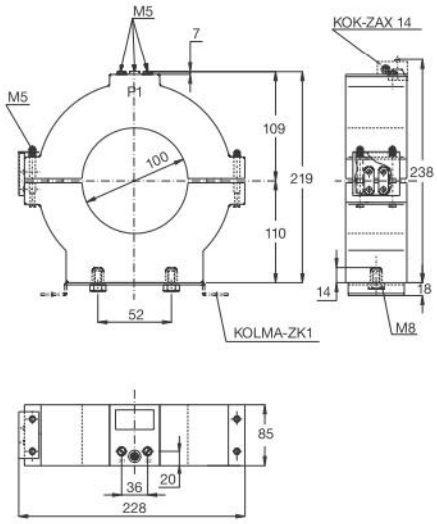


KOLMA 06 D1, D2

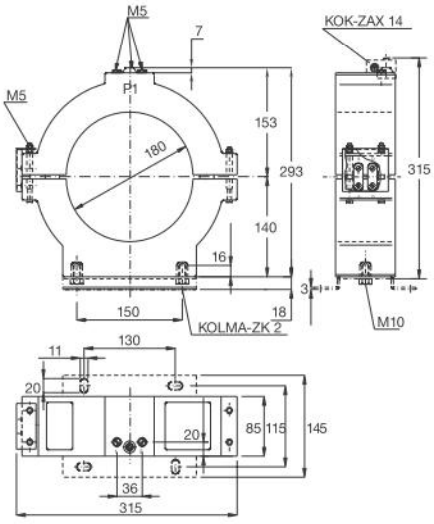


Typ	Rozměry [mm]			
	A	B	C	D
KOLMA 06 A2	58	177	196	140
KOLMA 06 B2	100	229	249	196

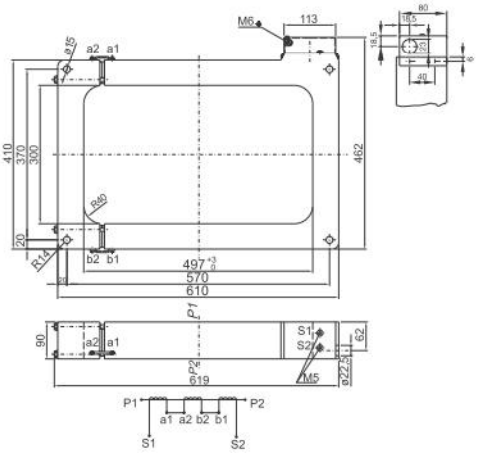
KOLA 06 B2



KOLA 06 D2



KOLA 06 J2



Kabelové proudové transformátory vnitřní typ KOKM

Proudové transformátory KOKM_ jsou určeny pro měření fázových proudů. Jako primární vodič slouží přípojnice nebo kabel. Proudové transformátory série KOKM lze rovněž použít pro měření fázového proudu při napětích vyšších než 0,72 kV (u KOKM 06) nebo 1,2 kV (u KOKM 1), pokud izolace primárního vodiče splňuje požadavky příslušných norem pro dané provozní napětí. Sekundární vinutí a kruhové železné jádro jsou zalita v pryskyřici, což zajišťuje dobré elektrické a mechanické vlastnosti.

Tabulka 6. Technická data

Typ transformátoru			KOKM 06_	KOKM 1_
Jmenovité napětí	U_m	[kV]	0,72 [1]	1,2 [1]
Napětí pro zkoušku při síťovém kmitočtu	U_p (1 min)	[kV]	3	6
Zkušební napětí	U_{pp}	[kV]	-	-
Kmitočet	f_n	[Hz]	50 nebo 60	
Max. primární proud	I_{pn}	[A]	50 ÷ 2 000	50 ÷ 10 000
Jmenovitý sekundární proud	I_{sn}	[A]	1 nebo 5	
Jmenovitý tepelný proud	I_{cont}	[A]	1,2 x I_{pn} [2]	
Krátkodobý výdržný proud	I_{th} (1 s)	[kA]	60 x I_{pn} (Max. 100 kA)	
Dynamický výdržný proud	I_{dyn}	[kA]	2,5 x I_{th} (Max. 250 kA)	
Sekundární svorky			pro vodič 6 mm^2	
Rozsah provozní teploty		[°C]	-25 … +40	
Doprava a skladování		[°C]	-40 … +55	
Elektrotechnické normy			IEC, VDE, ANSI, BS, AS, CAN	

[1] Izolační hladina primárního vodiče určuje maximální provozní napětí.
[2] Max. I_{cont} pro KOKM 06 I_{cont} = 2 400 A, pro KOKM 1 I_{cont}= 10 000 A.

Tabulka 7. Standardní parametry pro KOKM 1_

Typ	Proud		Třída přesnosti	Zátěž	Rozměry		
	primární [A]	sekundární [A]		[VA]	vnitřní [mm]	vnější [mm]	výška [mm]
KOKM 1 BC10	200	5	5P20	5	42	148	100
KOKM 1 DC8	100	1	10P10	2	60	148	80
KOKM 1 DF12	100	5	0,5	3	60	186	120
KOKM 1 DC6	150	1	5P20	1	60	148	60
KOKM 1 DC14	150	5	5P10	10	60	148	140
KOKM 1 DC12	300	5	5P10	15	60	148	120
KOKM 1 DC16	400	5	5P20	10	60	148	160
KOKM 1 DH10	5 000	5	1	10	60	200	100
KOKM 1 EC8	100	1	5P20	1	70	148	80
KOKM 1 EF16	100	1	0,5	1	70	186	160
KOKM 1 EC8	150	1	5P20	1	70	148	80
KOKM 1 EC6	200	1	5P20	1	70	148	60
KOKM 1 EC16	250	1	5P10	20	70	148	160
KOKM 1 EH16	250	1	5P20	20	70	200	160
KOKM 1 EC10	400	1	5P10	10	70	148	100
KOKM 1 EF14	400	1	5P20	20	70	186	140
KOKM 1 FC6	50	5	10P10	0,5	85	148	60
KOKM 1 FC16	300	5	5P10	10	85	148	160
KOKM 1 FC8	600	5	0,5	15	85	148	80
KOKM 1 FC12	600	5	0,5	50	85	148	120
KOKM 1 FC8	1 000	5	0,5	50	85	148	80
KOKM 1 GF6	50	5	10P10	0,5	90	186	60
KOKM 1 GF8	1 000	5	0,5	50	90	186	80
KOKM 1 GF6	1 500	5	0,5	50	90	186	60
KOKM 1 HF8	50	1	10P10	1	100	186	80
KOKM 1 HF8	50	5	10P10	1	100	186	80
KOKM 1 HH16	50	5	10P10	5	100	200	160
KOKM 1 HF12	100	1	10P20	2	100	186	120
KOKM 1 HK10	150	1	5P10	10	100	250	100
KOKM 1 HK10	200	1	5P10	10	100	250	100
KOKM 1 HK10	250	5	5P20	10	100	250	100
KOKM 1 HK10	300	5	5P20	10	100	250	100
KOKM 1 HK14	400	1	5P20	30	100	250	140
KOKM 1 HF6	400	5	10P10	5	100	186	60
KOKM 1 HF6	500	1	1	15	100	186	60
KOKM 1 HJ8	2 000	1	5P20	30	100	235	80
KOKM 1 KH8	50	1	10P10	1	120	200	80
KOKM 1 KH8	50	5	10P10	1	120	200	80
KOKM 1 KH18	200	5	5P20	5	120	200	180
KOKM 1 KH18	300	5	5P20	10	120	200	180
KOKM 1 KH10	1 000	1	5P10	20	120	200	100
KOKM 1 KH8	1 000	5	5P20	10	120	200	80
KOKM 1 KH8	1 500	5	0,5	50	120	200	80
KOKM 1 KH8	2 000	5	0,5	50	120	200	80
KOKM 1 KK10	2 500	5	5P20	10	120	250	100
KOKM 1 NK8	50	1	10P10	1	155	250	80
KOKM 1 NK12	50	1	10P10	2	155	250	120
KOKM 1 NK20	50	1	10P10	5	155	250	200
KOKM 1 NL14	50	1	10P10	5	155	270	140
KOKM 1 NL8	3 000	1	5P20	5	155	270	80
KOKM 1 RL12	50	1	10P10	2	180	270	120
KOKM 1 RL8	100	1	5P10	1	180	270	80
KOKM 1 RL12	100	1	5P10	5	180	270	120
KOKM 1 RL8	150	1	10P10	2	180	270	80
KOKM 1 RL20	300	5	5P20	10	180	270	200
KOKM 1 UT10	50	1	10P10	5	250	450	100
KOKM 1 UP16	100	5	10P10	5	250	340	160

Parametry závisí na typu (velikosti) transformátoru; obecně platí, že čím větší je proudový transformátor, tím vyšší jsou technické parametry.
V případě požadavků na jiné elektrické parametry, než jsou uvedeny v tabulkách, se prosím obraťte na naše prodejní oddělení.

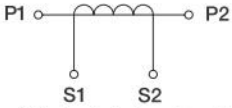
Objednací údaje

Objednávka by měla obsahovat následující údaje:
– typ proudového transformátoru
– jmenovitý primární proud/jmenovitý sekundární proud [A/A]
– jmenovitou zátěž a třídu přesnosti pro každé vinutí [VA]
– krátkodobý tepelný proud I_{th}
– rozměry okna [mm]
– normu
– množství

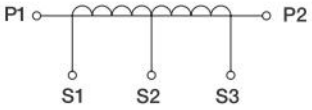
Příklad objednávky

KOKM 1 FC 8; 600/5 A/A; 10 VA; 0.5; I_{th} = 60xI_{pn}/1s; IEC 60044-1; 9 ks.

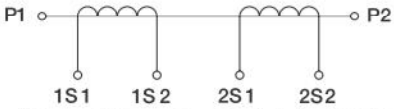
Značení svorek



příklad s jedním sekundárním vinutím: 100/1 [A/A]



příklad se sekundárním vinutím s více odbočkami: 50-100/1 [A/A]



příklad s dvěma sekundárními vinutími: 800/5/5 [A/A/A]

Záruka

Záruka je poskytována po dobu dvou let ode dne zahájení provozu transformátoru. Maximálně však po dobu tří let od zakoupení. Záruka se týká pouze výrobních vad a nevztahuje se na závady vzniklé v důsledku:
– nevhodné dopravy
– nesprávného skladování
– nedodržení pokynů během montáže a provozu
– nesprávného výběru transformátoru pro danou elektrickou soustavu.

KOKM 1 NK 10

Tabulka 8. KOKM 1_

Vnější průměr [mm]		Průměr otvoru [mm] A 33	B 42	D 60	E 70	F 85	G 90	H 100	K 120	N 155	R 180	S 200	U 250	W 350	X 400	Y 450	Z 500	Výkres	Výška odlitku [mm]	Celková výška [mm]	Střed otvoru - výška [mm]
C	148	60	60	60	60	60												KOKM 1_C_	183	249	112
		160	160	160	160	160															
F	186	60	60	60	60	60	60	60		← Rozsah šířek transformátorů								KOKM 1_F_	213	279	131
		160	160	160	160	160	160	160		↓											
H	200	80	80	80	80	80	80	80	80									KOKM 1_H_	235	301	138
		180	180	180	180	180	180	180	180												
J	235	80	80	80	80	80	80	80	80									KOKM 1_J_	265	331	158
		300	300	300	300	300	300	300	300												
K	250	80	80	80	80	80	80	80	80	80								KOKM 1_K_	275	341	158
		200	200	200	200	200	200	200	200	200											
L	270	80	80	80	80	80	80	80	80	80	80	80						KOKM 1_L_	297	363	158
		200	200	200	200	200	200	200	200	200	200	200									
M	280	80	80	80	80	80	80	80	80	80	80	80						KOKM 1_M_	297	363	158
		240	240	240	240	240	240	240	240	240	240	240									
P	340		80	80	80	80	80	80	80	80	80	80	80					KOKM 1_P_	379	445	204
			200	200	200	200	200	200	200	200	200	200	200								
T	450					80	80	80	80	80	80	80	80	80				KOKM 1_T_	465	513	225
						200	200	200	200	200	200	200	200	200							
W	590						80	80	80	80	80	80	80	80	80	80	80	KOKM 1_W_	605	653	300
							200	200	200	200	200	200	200	200	200	200	200				

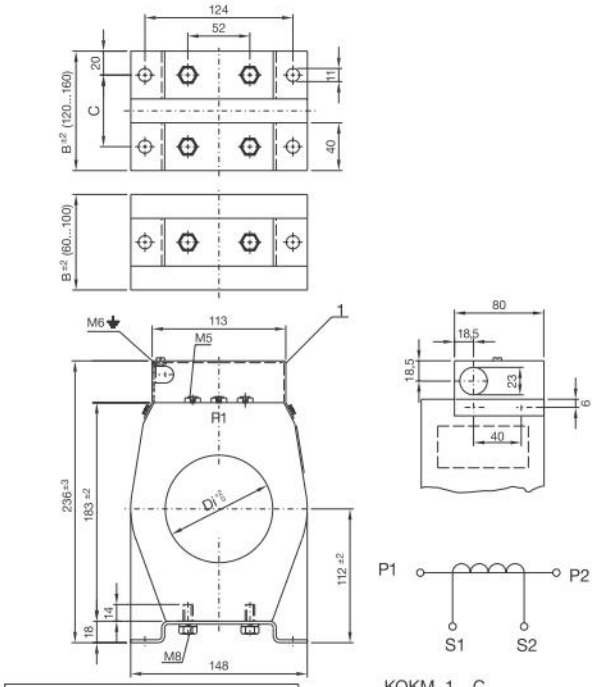
Příklad

KOKM 1 D C 10

- **10** → Šířka transformátoru
  10 = 100 mm (možnosti – 6, 8, 10, 12, 14, 16, 18, 20, 22, 24,... 30)
- **C** → Vnější průměr
  C = 148 mm
- **D** → Průměr otvoru
  D = 60 mm
- **1** → Jmenovité napětí 1 = 1,2 kV
- **KOKM** → Typ KOKM – vnitřní použití
  (Typ KOKU – vnější použití)

Celkové rozměry

KOKM 1_C_



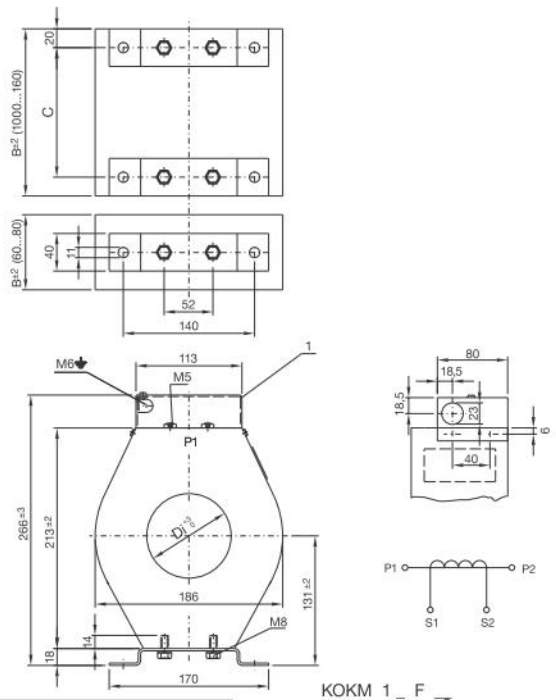
Di =	33 A	42 B	60 D	70 E	85 F
B =	60	80	100	120	140
C =				80	100

	6	8	10	12	14	16
B =	60	80	100	120	140	160
C =				80	100	120

KOKM 1 _ C _

Note:
KOKM 1_C6 without the cover

KOKM 1_F_



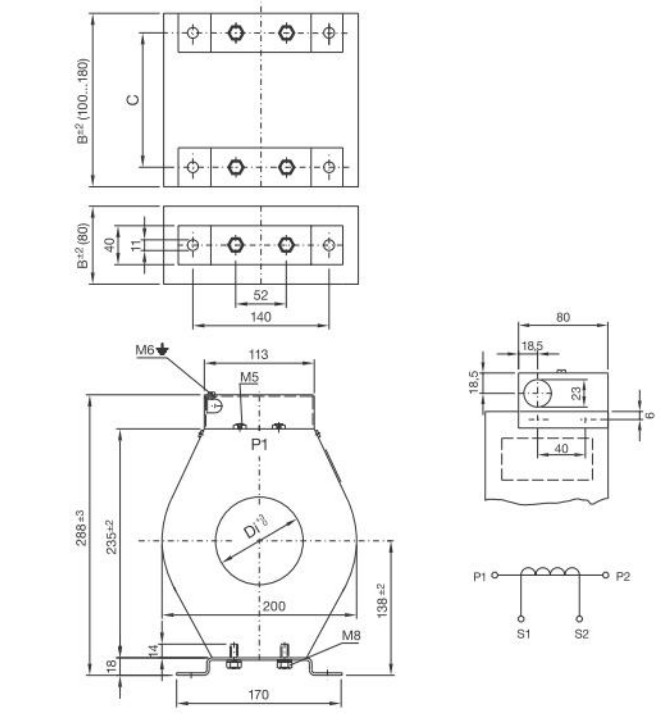
Di =	33 A	42 B	60 D	70 E	85 F	90 G	100 H
B =	60	80	100	120	140	160	
C =			60	80	100	120	

	6	8	10	12	14	16
B =	60	80	100	120	140	160
C =			60	80	100	120

KOKM 1 _ F _

Note:
KOKM 1_F6 without the cover

KOKM 1_H_

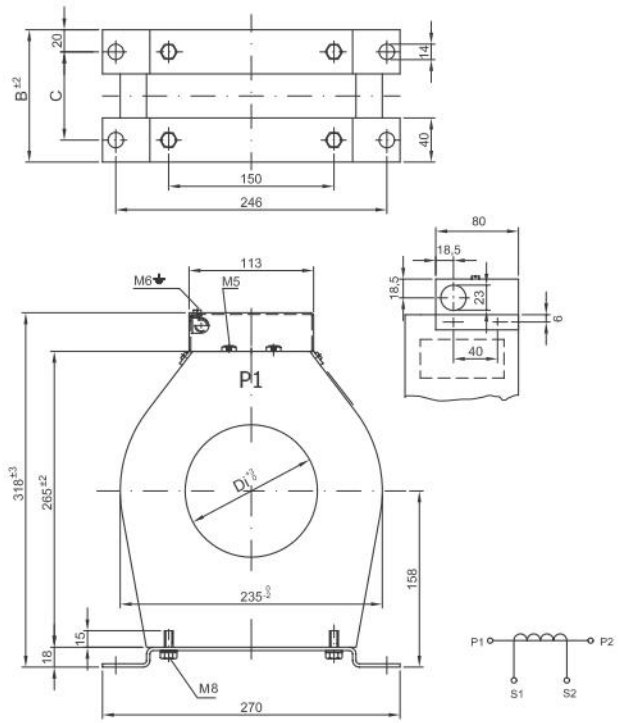


Di =	33 A	42 B	60 D	70 E	85 F	90 G	100 H	120 K
B =	80	100	120	140	160	180		
C =		60	80	100	120	140		

	8	10	12	14	16	18
B =	80	100	120	140	160	180
C =		60	80	100	120	140

KOKM 1 _ H _

KOKM 1_J_



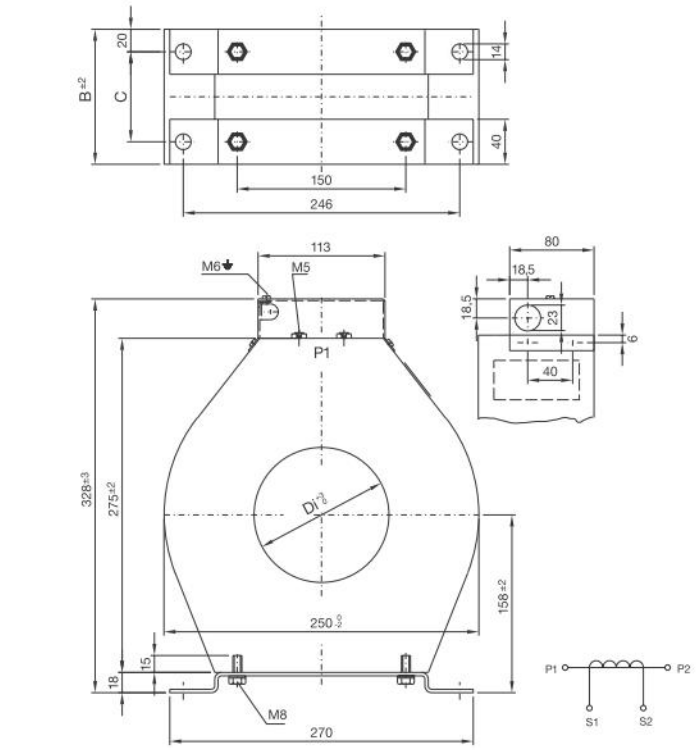
Di =	33 A	42 B	60 D	70 E	85 F	90 G	100 H	120 K	155 N
B =	80	100	120	140	160	180	200	220	240
C =	40	60	80	100	120	140	160	180	200

	8	10	12	14	16	18	20	22	24	26	28	30
B =	80	100	120	140	160	180	200	220	240	260	280	300
C =	40	60	80	100	120	140	160	180	200	220	240	260

KOKM 1 _ J _

Celkové rozměry

KOKM 1_K_

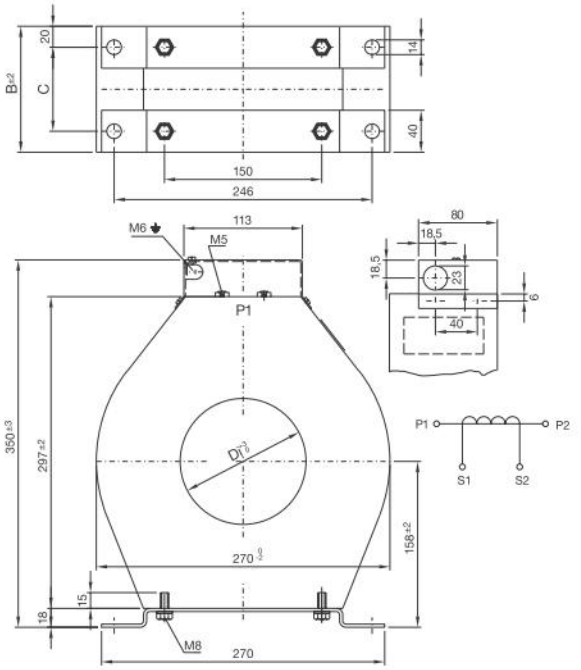


Di =	33	42	60	70	85	90	100	120	155
	A	B	D	E	F	G	H	K	N

	8	10	12	14	16	18	20
B =	80	100	120	140	160	180	200
C =	40	60	80	100	120	140	160

KOKM 1 _K_

KOKM 1_L_

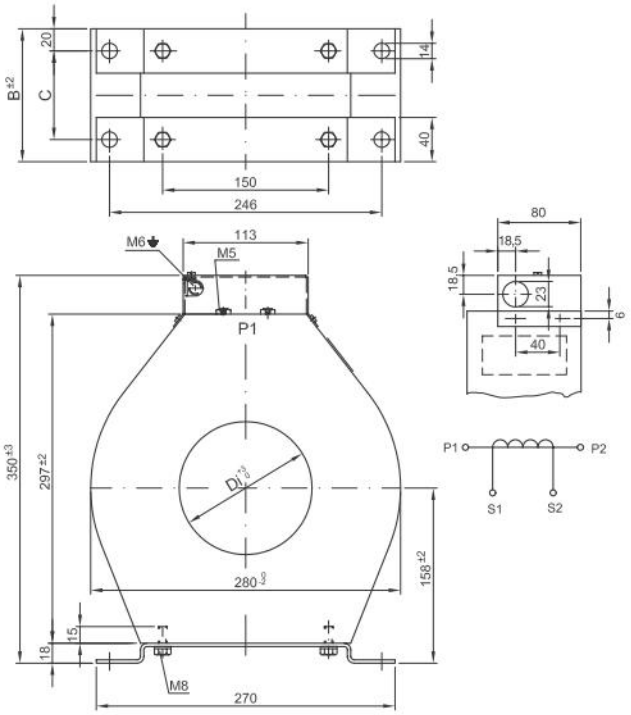


Di =	33	42	60	70	85	90	100	120	155	180	200
	A	B	D	E	F	G	H	K	N	R	S

	8	10	12	14	16	18	20
B =	80	100	120	140	160	180	200
C =	40	60	80	100	120	140	160

KOKM 1 _L_

KOKM 1_M_

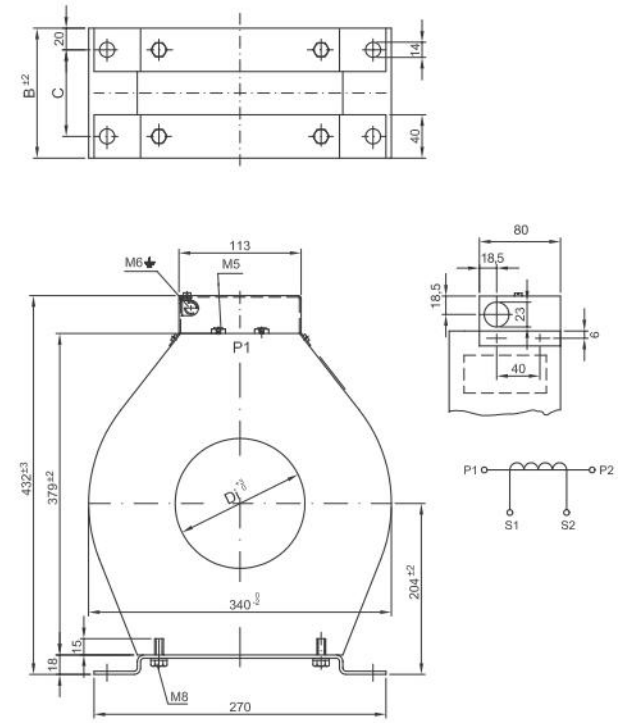


Di =	33	42	60	70	85	90	100	120	155	180	200
	A	B	D	E	F	G	H	K	N	R	S

	8	10	12	14	16	18	20	22	24
B =	80	100	120	140	160	180	200	220	240
C =	40	60	80	100	120	140	160	180	200

KOKM 1 _M_

KOKM 1_P_



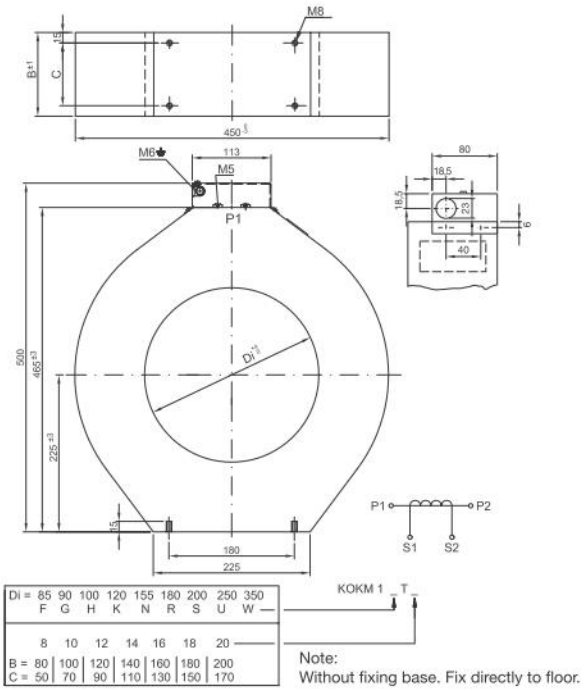
Di =	42	60	70	85	90	100	120	155	180	200	250
	B	D	E	F	G	H	K	N	R	S	U

	8	10	12	14	16	18	20
B =	80	100	120	140	160	180	200
C =	40	60	80	100	120	140	160

KOKM 1 _P_

Celkové rozměry

KOKM 1_T_

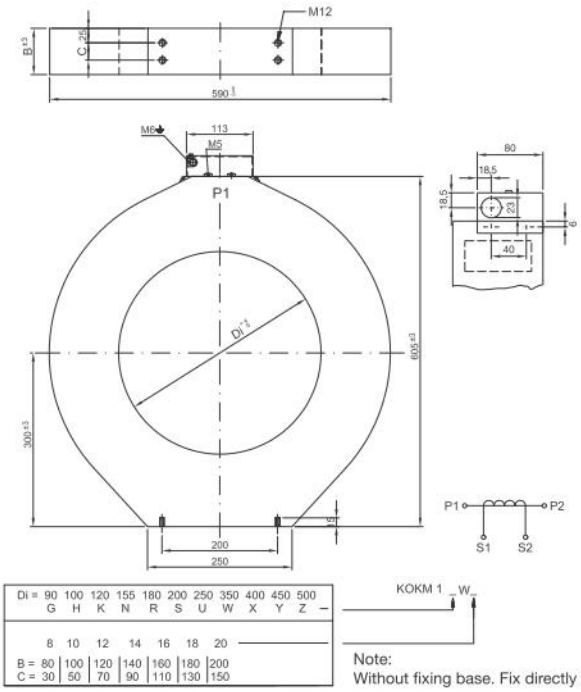


Di =	85 F	90 G	100 H	120 K	155 N	180 R	200 S	250 U	350 W
	8	10	12	14	16	18	20		
B =	80	100	120	140	160	180	200		
C =	50	70	90	110	130	150	170		

KOKM 1 _ T _

Note:
Without fixing base. Fix directly to floor.

KOKM 1_W_



Di =	90 G	100 H	120 K	155 N	180 R	200 S	250 U	350 W	400 X	450 Y	500 Z
	8	10	12	14	16	18	20				
B =	80	100	120	140	160	180	200				
C =	30	50	70	90	110	130	150				

KOKM 1 _ W _

Note:
Without fixing base. Fix directly to floor.

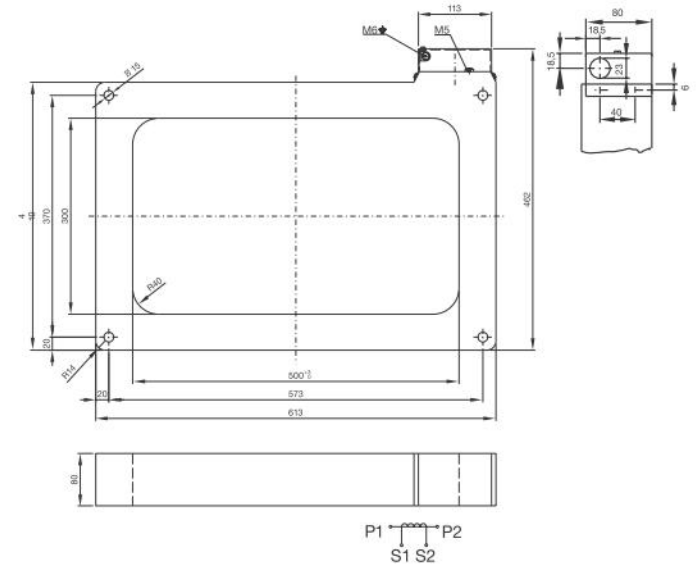
Tabulka 9.
Standardní parametry pro KOKM 06 J_ (typ s oknem) f = 50 Hz

Typ	Okno [mm]	Primární proud [A]	Sekundární proud [A]	Třída přesnosti	Zátěž [VA]
KOKM 06 J2	300x500	50	1	10P10	1
KOKM 06 J2	300x500	50	5	10P10	0,5
KOKM 06 J2	300x500	100	1	10P10	2
KOKM 06 J2	300x500	100	5	10P10	1
KOKM 06 J2	300x500	150	1	10P10	2
KOKM 06 J2	300x500	300	5	10P10	1
KOKM 06 J2	300x500	500	1	5P10	10
KOKM 06 J2	300x500	600	5	10P10	5
KOKM 06 J2	300x500	800	5	0,5	15
KOKM 06 J21	150x500	50	1	10P10	1
KOKM 06 J21	150x500	100	5	10P10	1
KOKM 06 J21	150x500	700	1	5P10	3
KOKM 06 J21	150x500	2 000	1	1	5
KOKM 06 J22	300x200	50	1	10P10	1
KOKM 06 J22	300x200	100	1	10P10	2
KOKM 06 J22	300x200	300	1	5P10	3
KOKM 06 J22	300x200	1 200	5	5P10	30
KOKM 06 J22	300x200	2 000	5	5P10	50
KOKM 06 J23	600x200	50	1	10P10	1
KOKM 06 J23	600x200	50	5	10P10	0,5
KOKM 06 J23	600x200	100	1	10P10	3
KOKM 06 J23	600x200	200	1	10P10	2
KOKM 06 J24	300x200	50	1	10P10	1
KOKM 06 J24	300x250	150	1	10P10	2
KOKM 06 J29	450x650	50	1	10P10	1
KOKM 06 J29	450x650	50	5	10P10	0,5
KOKM 06 J29	450x650	100	1	10P10	2
KOKM 06 J29	450x650	400	1	5P10	7,5

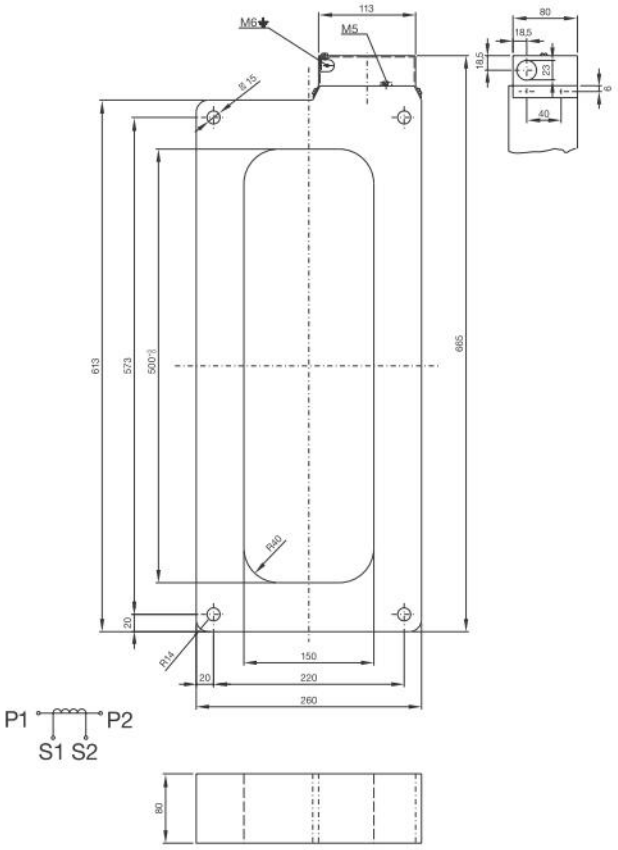
V případě požadavků na jiné elektrické parametry, než jsou uvedeny v tabulkách, se prosím obrafte na naše prodejní oddělení.

Celkové rozměry

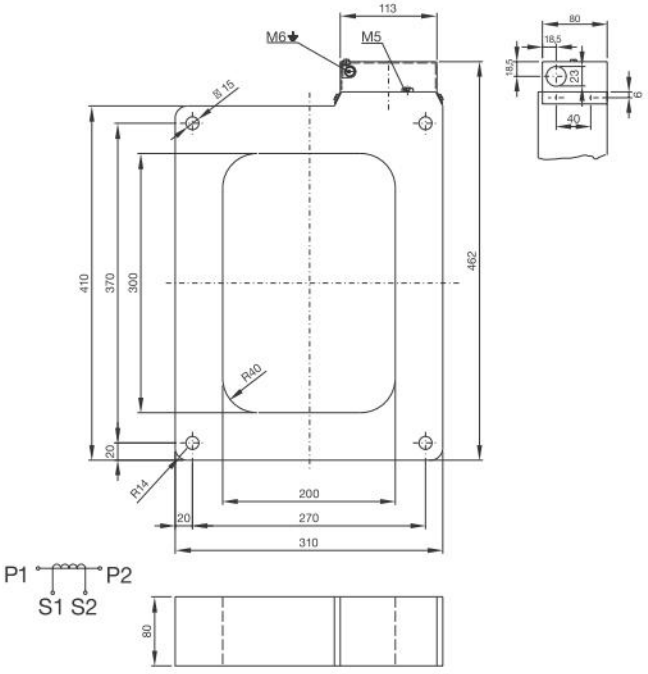
KOKM 06 J2



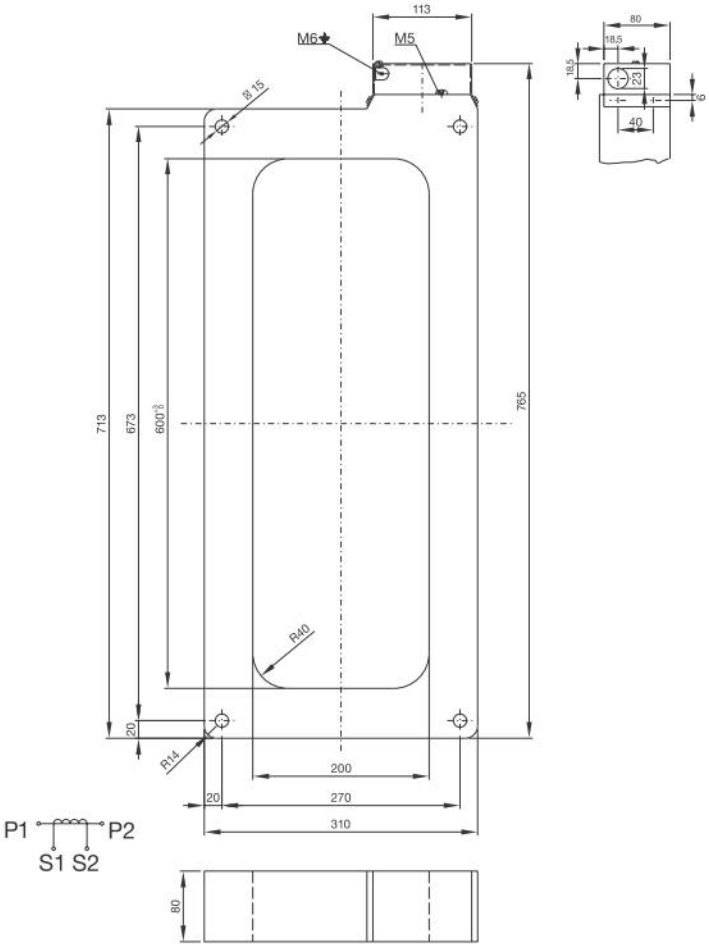
KOKM 06 J21



KOKM 06 J22

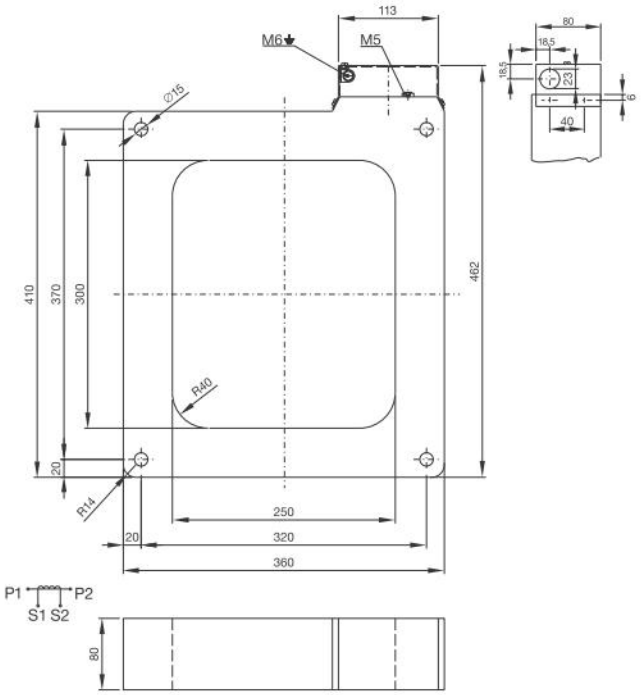


KOKM 06 J23

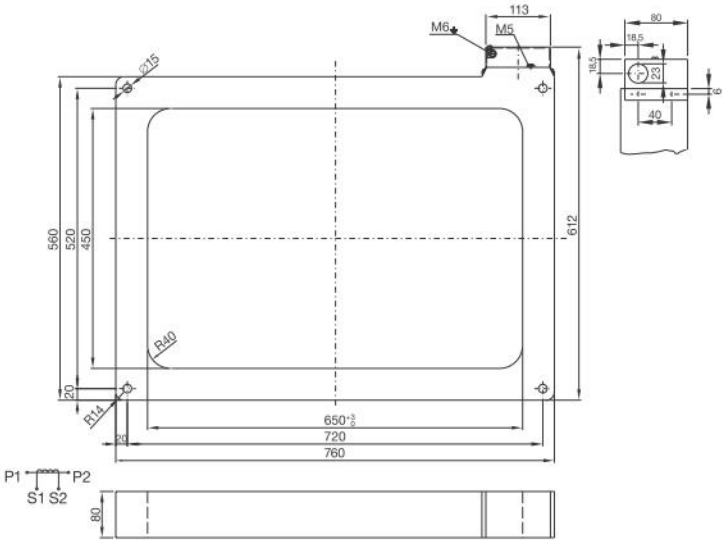


Celkové rozměry

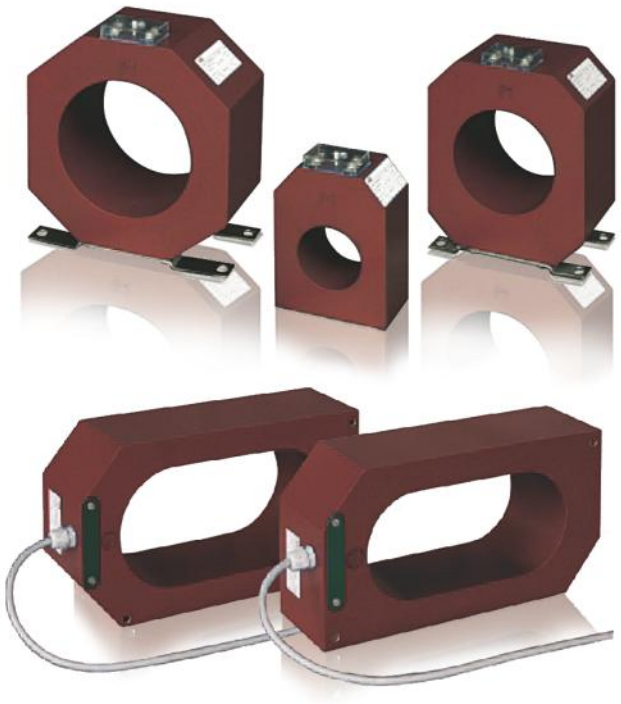
KOKM 06 J24



KOKM 06 J29



Kabelové proudové transformátory vnitřní typ KOKM (pro GIS typu ZX)



KOKM 1 LH_ je vnitřní, kabelový, nízkonapěťový proudový transformátor v pryskyřičné izolaci. Tyto typy transformátorů jsou vhodné pro měření fázových proudů. Jako primární vodič slouží přípojnice nebo nízkonapěťový kabel. Proudové transformátory ze série KOKM lze rovněž použít pro měření fázových proudů při napětích vyšších než 1,2 kV, pokud izolace vysokonapěťového primárního vodiče splňuje požadavky příslušných norem pro dané pracovní napětí.

Objednací údaje

Objednávka by měla obsahovat následující údaje:
– typ proudového transformátoru
– jmenovitý primární proud/jmenovitý sekundární proud [A/A]
– jmenovitou zátěž a třídu přesnosti pro každé vinutí [VA]
– krátkodobý tepelný proud I_{th}
– normu
– množství

Příklad objednávky

KOKM 06 NN; 12 150/1 A/A, I_{th} = 60 x I_{pn}, 1 VA 10P10 – 3 ks.

Tabulka 10. Technická data

Typ	KOKM 1 LH_
Max. počet vinutí	1
Izolační hladina	1/6/-
Nejvyšší povolené napětí proudového transformátoru U_r	1,2 kV
Jmenovité zkušební napětí izolace (50 Hz, 1 min U_D)	6 kV
Jmenovitý kmitočet	50 Hz
Jmenovitý tepelný proud	1,2 x I_{pn}
Krátkodobý výdržný tepelný proud I_{th}, 1 s	60 x I_{pn}
Jmenovitý dynamický proud I_{dyn}	2,5 x I_{th}
Rozsah provozní teploty	-5 ... +40 °C
Soulad s normami	IEC, ANSI, PN-EN, CAN

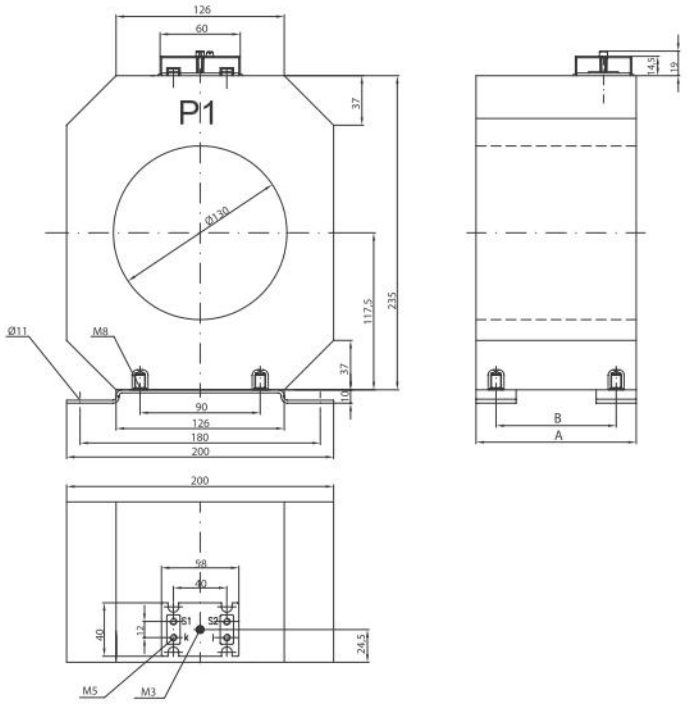
Tabulka 11. Standardní parametry pro KOKM 1 LH_

Primární proud I_{pn} [A]	Maximální povolená zátěž [VA]											
	Sekundární proud I_{sn} = 1 [A]						Sekundární proud I_{sn} = 5 [A]					
	Třída měření FS		Třída ochrany Fa				Třída měření Fs		Třída ochrany Fa			
	0,5	1	10P10	10P20	5P10	5P20	0,5	1	10P10	10P20	5P10	5P20
50	–	–	2	1	0,5	0,5	–	–	1,5	1	0,5	0,5
60	–	–	2	1	0,5	0,5	–	–	2	1	1	0,5
70	–	–	2,5	1	1,5	1	–	–	2,5	1	1,5	1
75	–	–	2,5	1	1,5	1	–	–	2,5	1,5	2	1
100	–	1,5	3,5	1,5	3,5	1,5	–	1,5	3	1,5	3	1,5
110	–	3	4	1,5	4	1,5	–	2,5	3,5	1,5	3,5	1,5
120	–	3,5	4	1,5	4	1,5	–	3,5	3,5	1,5	3,5	1,5
140	–	6	5	1,5	5	2	–	7,5	4,5	2	4,5	2
150	–	8,5	5,5	2	5,5	2	–	8,5	5	2	5	2
200	4	20	7,5	2	7,5	3	2,5	11	7	2,5	7	2,5
240	9	30	8,5	3,5	8,5	3,5	9	29	8,5	3	8,5	3
250	10	32	9	3,5	9	3,5	10	33	9	3,5	9	3,5
300	17	50	11	4	11	4	19	50	10	4,5	10	4,5
350	29	60	12	4,5	12	4,5	29	60	12	5,5	12	5,5
400	60	90	12	3	12	3	39	60	14	6	14	6
500	60	90	15	4	15	4	50	90	18	8	18	8
600	60	90	18	5,5	18	5,5	60	90	21	8,5	21	8,5
630	60	90	19	5,5	19	5,5	60	90	21	8,5	21	8,5
800	90	90	20	5,5	20	5,5	90	90	26	9	26	9
1000	90	90	26	7	26	7	90	90	27	5,5	27	5,5
1200	90	90	31	8,5	31	8,5	90	90	30	6	30	6
1250	90	90	31	8	31	8	90	90	32	6,5	32	6,5

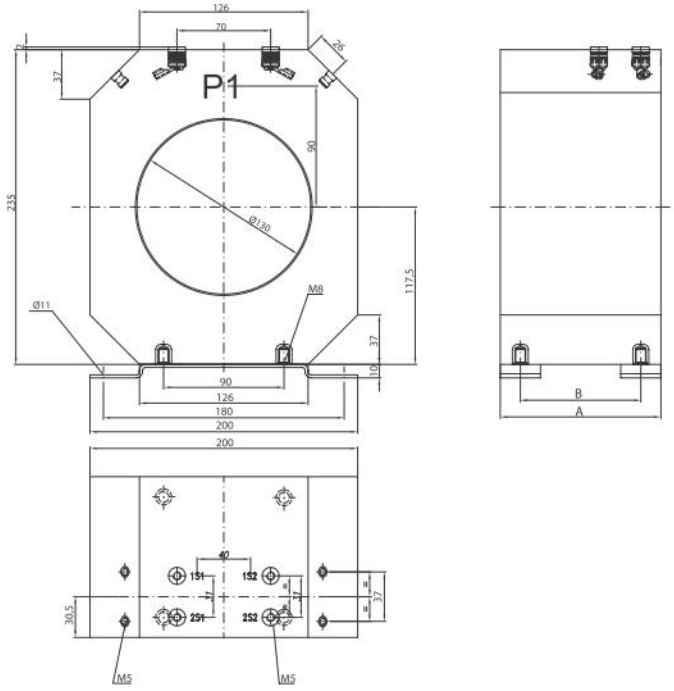
Na zvláštní přání lze dodat proudové transformátory s jinými hodnotami sekundárního proudu než ve výše uvedené tabulce (např. 4,3 A) a proudové transformátory pro kmitočet 60 Hz.

Celkové rozměry

KOKM 1 LH_ verze 01

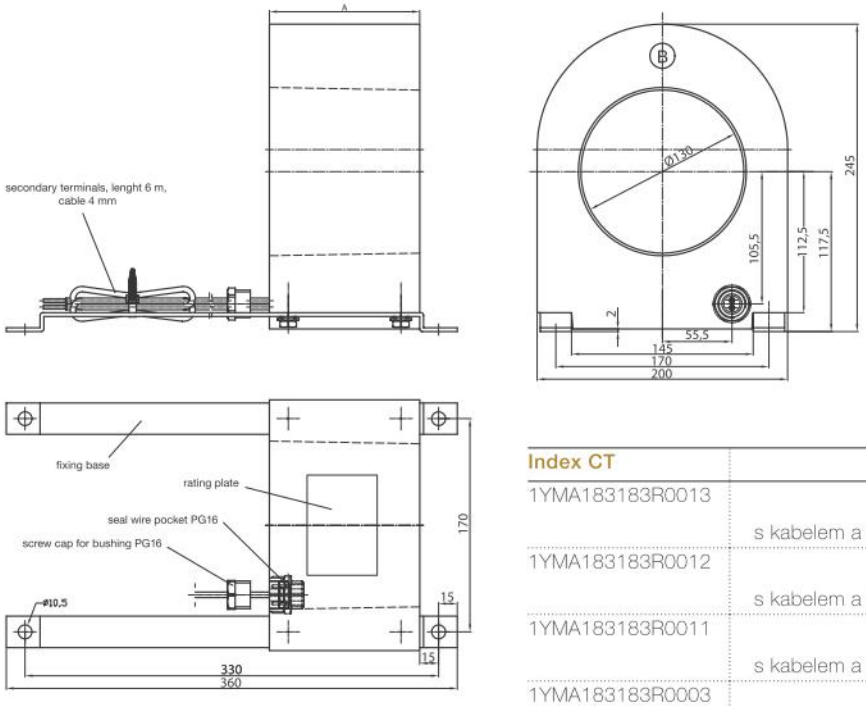


KOKM 1 LH_ verze 02



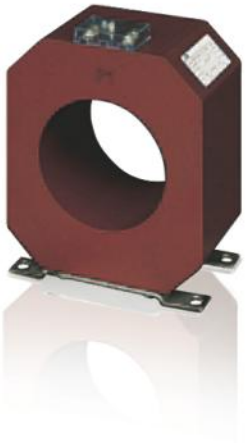
Typ	Rozměry [mm]	
	A	B
KOKM 1 LH 6	60	30
KOKM 1 LH 9	90	60
KOKM 1 LH 12	120	90

KOKM 1 LH_ verze 03



Index CT	Popis	Kód	A	B
1YMA183183R0013	CT KOKM 1 LH 12 s kabelem a P2 z kabelové strany	KOKM 1 LH 12-v3-P2	120	P2
1YMA183183R0012	CT KOKM 1 LH 9 s kabelem a P2 z kabelové strany	KOKM 1 LH 9-v3-P2	90	P2
1YMA183183R0011	CT KOKM 1 LH 6 s kabelem a P2 z kabelové strany	KOKM 1 LH 6-v3-P2	60	P2
1YMA183183R0003	CT KOKM 1 LH 12 s kabelem a P1 z kabelové strany	KOKM 1 LH 12-v3-P1	120	P1
1YMA183183R0002	CT KOKM 1 LH 9 s kabelem a P1 z kabelové strany	KOKM 1 LH 9-v3-P1	90	P1
1YMA183183R0001	CT KOKM 1 LH 6 s kabelem a P1 z kabelové strany	KOKM 1 LH 6-v3-P1	60	P1

KOKM 1 NJ_ je vnitřní, kabelový, nízkonapěťový proudový transformátor v pryskyřičné izolaci. Tyto typy transformátorů jsou vhodné pro měření fázových proudů v nízkonapěťových rozváděčích. Jako primární vodič slouží neizolovaná přípojnice nebo nízkonapěťový kabel. Proudové transformátory ze série KOKM lze rovněž použít pro měření fázových proudů při napětích vyšších než 1,2 kV, pokud izolace vysokonapěťového primárního vodiče splňuje požadavky příslušných norem pro dané pracovní napětí.



KOKM 1 NJ 8 verze 01

Tabulka 12. Technická data

Typ	KOKM 1 NJ_
Max. počet vinutí	1
Nejvyšší povolené napětí proudového transformátoru U_r	1,2 kV
Jmenovité zkušební napětí izolace (50 Hz, 1 min U_p)	6 kV
Jmenovitý kmitočet	50 Hz
Jmenovitý tepelný proud	1,2 x I_{pn}
Krátkodobý výdržný tepelný proud I_{th}, 1 s	60 x I_{pn}
Jmenovitý dynamický proud I_{dyn}	2,5 x I_{th}
Rozsah provozní teploty	-5 … +40 °C
Soulad s normami	IEC, ANSI, PN-EN, CAN

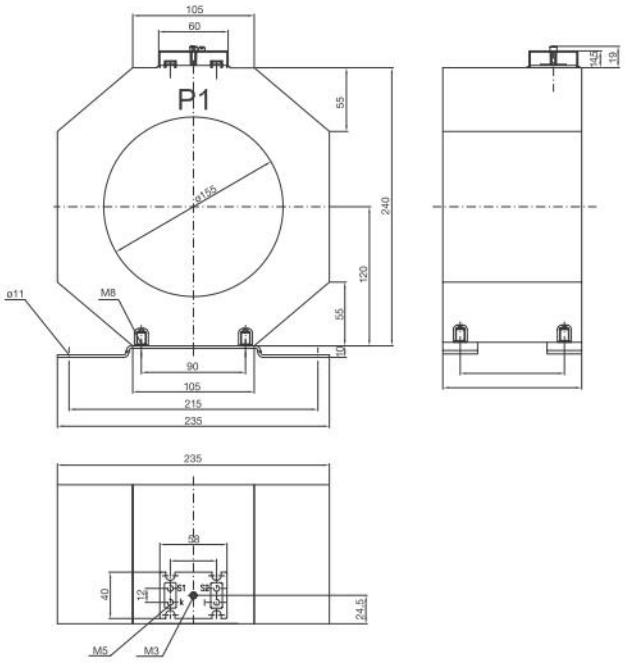
Tabulka 13. Standardní parametry pro KOKM 1 NJ_

Primární proud I_{pn} [A]	Maximální povolená zátěž [VA]											
	Sekundární proud I_{sn} = 1 [A]						Sekundární proud I_{sn} = 5 [A]					
	Třída měření FS		Třída ochrany Fa				Třída měření FS		Třída ochrany Fa			
	0,5	1	10P10	10P20	5P10	5P20	0,5	1	10P10	10P20	5P10	5P20
50	–	–	2	1	0,5	0,5		–	2	0,5	0,5	0,5
60	–	–	2,5	1	0,5	1	–	–	2,5	1,5	0,5	0,5
70	–	–	3	1,5	1,5	1,5	–	–	3	1,5	1	1
75	–	–	3,5	1,5	2	1,5	–	–	3	1,5	1,5	1
100	–	0,5	4,5	2	4	2	–	0,5	4	1,5	4	1,5
110	–	2	5	2,5	4,5	2,5	–	1,5	4,5	2	4,5	2
120	–	3,5	5,5	2,5	5,5	2,5	–	3	5	2	5	2
140	–	5	6,5	3	6,5	3	–	4,5	6	2,5	6	2,5
150	–	6,5	7	3	7	3	–	5	6,5	3	6,5	3
200	1,5	8	8	3,5	8	3,5	1	9	9	4	9	4
240	4,5	13,5	9,5	4,5	9,5	4,5	4,5	14	10	5	10	5
250	5	15	10	4,5	10	4,5	5	15	11	5	11	5
300	9	23	12	5,5	12	5,5	11	26	13	6	13	6
350	18	35	14	6,5	14	6,5	18	32	15	7	15	7
400	29	50	16	7,5	16	7,5	20	40	18	8	18	8
500	35	80	20	9	20	9	30	60	20	10	20	10
600	50	90	24	11	24	11	45	90	25	12	25	12
630	50	90	25	11	25	11	50	90	26	12	26	12
800	60	90	31	14	31	14	90	90	30	13	30	13
1000	90	90	38	16	38	16	90	90	38	14	38	14
1200	90	90	42	18	42	18	60	90	40	13	40	13
1250	90	90	45	18	45	19	60	90	40	12	40	12

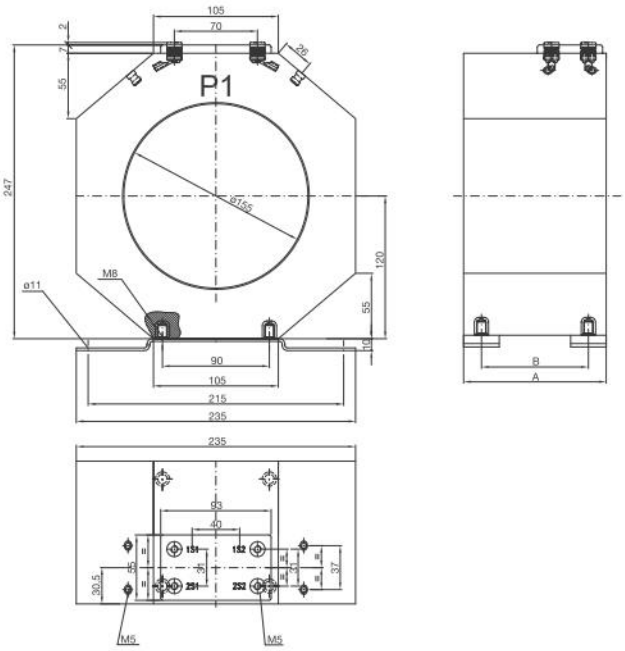
Na zvláštní přání lze dodat proudové transformátory s jinými hodnotami sekundárního proudu než ve výše uvedené tabulce (např. 4,3 A) a proudové transformátory pro kmitočet 60 Hz.

Celkové rozměry

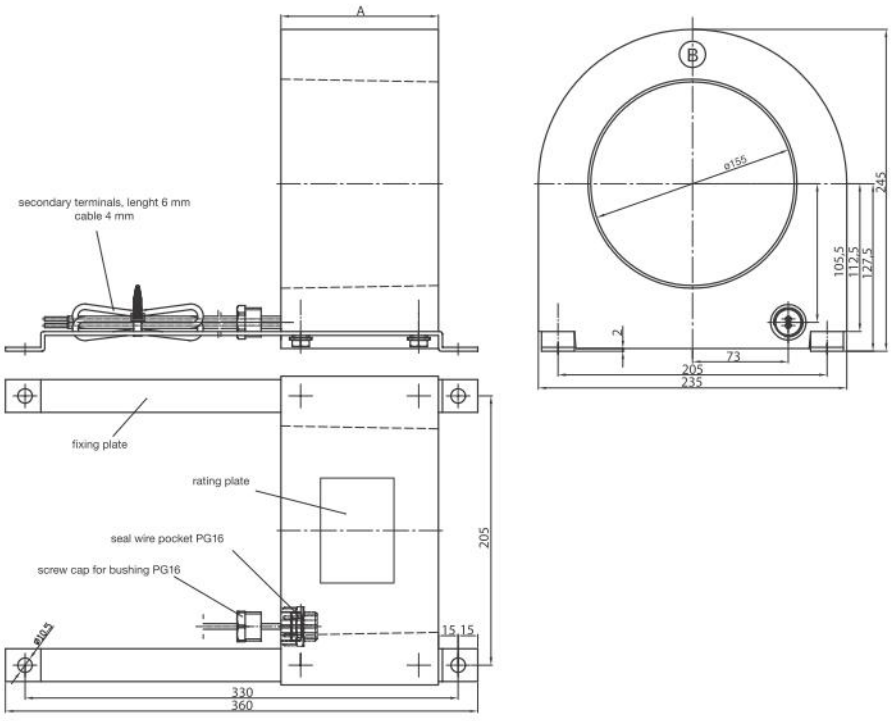
KOKM 1 NJ_ verze 01



KOKM 1 NJ_ verze 02



Typ	Rozměry [mm]	
	A	B
KOKM 1 NJ 6	60	30
KOKM 1 NJ 9	90	60
KOKM 1 NJ 12	120	90



Index CT	Popis	Kód	A	B
1YMA183182R0013	CT KOKM 1 NJ 12 s kabelem a P2 z kabelové strany	KOKM 1 NJ 12-v3-P2	120	P2
1YMA183182R0012	CT KOKM 1 NJ 9 s kabelem a P2 z kabelové strany	KOKM 1 NJ 9-v3-P2	90	P2
1YMA183182R0011	CT KOKM 1 NJ 6 s kabelem a P2 z kabelové strany	KOKM 1 NJ 6-v3-P2	60	P2
1YMA183182R0003	CT KOKM 1 NJ 12 s kabelem a P1 z kabelové strany	KOKM 1 NJ 12-v3-P1	120	P1
1YMA183182R0002	CT KOKM 1 NJ 9 s kabelem a P1 z kabelové strany	KOKM 1 NJ 9-v3-P1	90	P1
1YMA183182R0001	CT KOKM 1 NJ 6 s kabelem a P1 z kabelové strany	KOKM 1 NJ 6-v3-P1	60	P1

KOKM 1 EB_ a KOKM 1 ED_ jsou vnitřní, kabelové, nízkonapěťové proudové transformátory v pryskyřičné izolaci. Tyto typy transformátorů jsou vhodné pro měření fázových proudů. Jako primární vodič slouží přípojnice nebo kabel. Proudové transformátory ze série KOKM lze rovněž použít pro měření fázových proudů při napětích vyšších než 1,2 kV, pokud izolace vysokonapěťového primárního vodiče splňuje požadavky příslušných norem pro dané pracovní napětí.

KOKM 1 EB_ verze 03

Tabulka 14. Technická data

Typ	KOKM 1 EB_, KOKM 1 ED_
Max. počet vinutí	3
Izolační hladina	1/6/-
Nejvyšší povolené napětí proudového transformátoru U_r	1,2 kV
Jmenovité zkušební napětí izolace (50 Hz, 1 min U_p)	6 kV
Jmenovitý kmitočet	50 Hz, 60 Hz
Jmenovitý tepelný proud	1,2 x I_{pn}
Krátkodobý výdržný tepelný proud I_{th}, 1 s	60 x I_{pn}
Jmenovitý dynamický proud I_{dyn}	2,5 x I_{th}
Rozsah provozní teploty	-5 ... +40 °C
Soulad s normami	IEC, ANSI, PN-EN, CAN

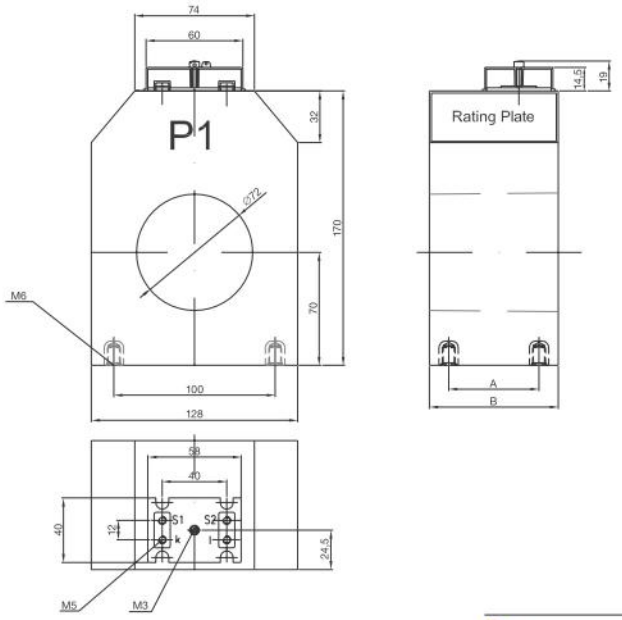
Tabulka 15. Standardní parametry pro KOKM 1 EB_

Primární proud I_{pn} [A]	Maximální povolená zátěž [VA]									
	Sekundární proud I_{sn} = 1 [A]					Sekundární proud I_{sn} = 5 [A]				
	Třída měření FS		Třída ochrany Fa			Třída měření Fs		Třída ochrany Fa		
	0,5	1	10P10	5P10	5P20	0,5	1	10P10	5P10	5P20
50	–	–	0,5	0,5	0,5	–	–	0,5	–	–
60	–	–	0,5	0,5	0,5	–	–	0,5	0,5	–
70	–	0,5	1	1	0,5	–	0,5	0,5	0,5	–
75	–	1	1	1	0,5	–	1	1	1	–
100	–	2,5	1,5	1,5	0,5	–	1,5	1	1	–
110	0,5	4	1,5	1,5	0,5	–	2,5	1	1	–
120	1	4,5	1,5	1,5	0,5	0,5	3	1,5	1,5	–
140	1	4,5	1,5	1,5	0,5	1,5	7	2	2	0,5
150	1,5	6	2	2	0,5	1,5	7	2	2	0,5
200	5,5	8,5	2,5	2,5	0,5	2,5	12	2,5	2,5	1
240	5,5	20	2,5	2,5	0,5	8	25	3,5	3,5	1
250	4,5	25	3	3	0,5	11	28	3,5	3,5	1
300	12	40	3	3	0,5	15	40	4,5	4,5	1,5
350	9	27	5	5	1	22	45	5	5	1,5
400	22	40	4,5	4,5	1,5	30	60	6	6	2
500	35	50	6	6	2	45	60	6	6	1,5
600	60	60	6	6	1	60	60	5,5	5,5	–
630	60	60	5	5	0,5	60	60	6	6	–
800	60	60	5	5	–	60	60	7	7	–
1000	60	60	6	6	–	60	60	–	–	–

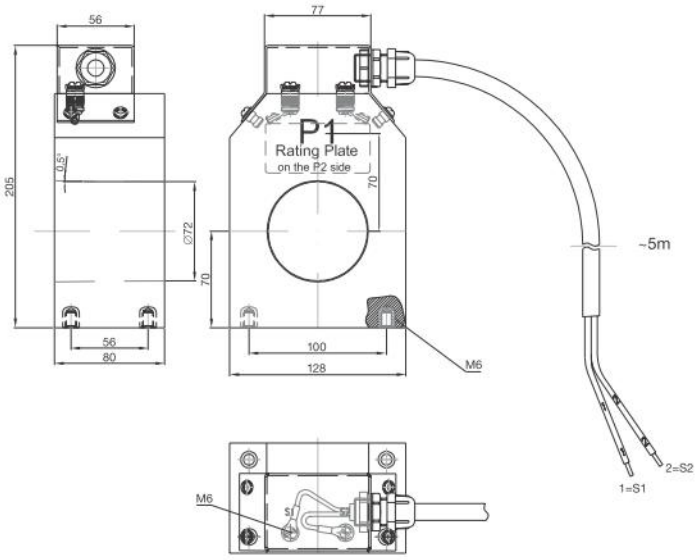
Na zvláštní přání lze dodat proudové transformátory s jinými hodnotami sekundárního proudu než ve výše uvedené tabulce (např. 4,3 A) a proudové transformátory pro kmitočet 60 Hz.

Celkové rozměry

KOKM 1 EB_ verze 01

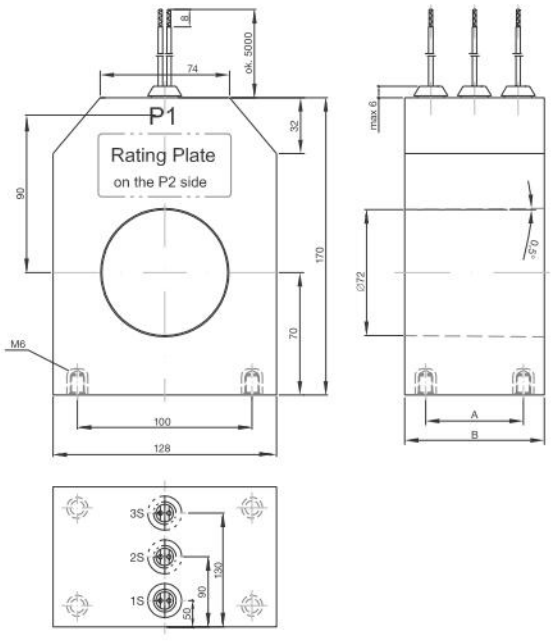


KOKM 1 EB_ verze 02

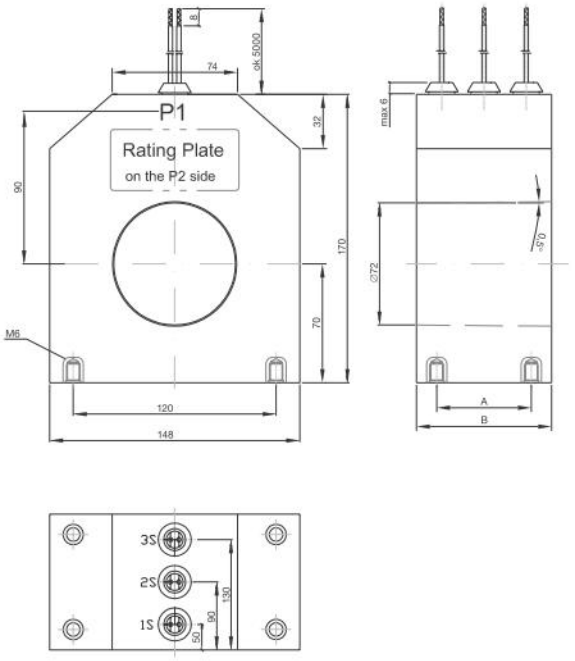


Typ	Rozměry [mm]	
	A	B
KOKM 1 E ...8	56	80
KOKM 1 E ...10	76	100
KOKM 1 E ...12	96	120

KOKM 1 EB_ verze 03

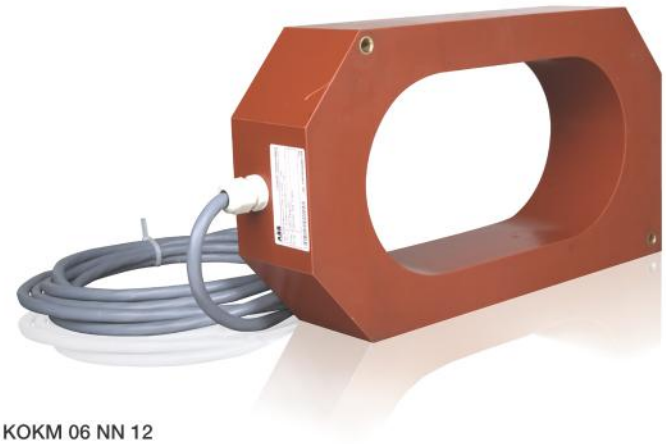


KOKM 1 ED_



Typ	Rozměry [mm]	
	A	B
KOKM 1 E ...8	56	80
KOKM 1 E ...10	76	100
KOKM 1 E ...12	96	120
KOKM 1 E ...14	116	140
KOKM 1 E ...16	136	160
KOKM 1 E ...18	156	180

KOKM 06 NN_ je vnitřní, kabelový, nízkonapěťový proudový transformátor v pryskyřičné izolaci. Tyto typy transformátorů jsou vhodné pro měření fázových proudů. Jako primární vodič slouží neizolovaná přípojnice nebo kabel. Proudové transformátory ze série KOKM lze rovněž použít pro měření fázových proudů při napětích vyšších než 0,72 kV, pokud izolace vysokonapěťového primárního vodiče splňuje požadavky příslušných norem pro dané pracovní napětí.



KOKM 06 NN 12

Tabulka 16. Technická data

Typ	KOKM 06 NN_
Max. počet vinutí	2
Izolační hladina	0,6/3/-
Nejvyšší povolené napětí proudového transformátoru U_r	0,72 kV
Jmenovité zkušební napětí izolace (50 Hz, 1 min U_p)	3 kV
Jmenovitý kmitočet	50 Hz
Jmenovitý tepelný proud	1,2 x I_{pn}
Krátkodobý výdržný tepelný proud I_{th}, 1 s	60 x I_{pn}
Jmenovitý dynamický proud I_{dyn}	2,5 x I_{th}
Rozsah provozní teploty	-5 ... +40 °C
Soulad s normami	IEC, ANSI, PN-EN, CAN

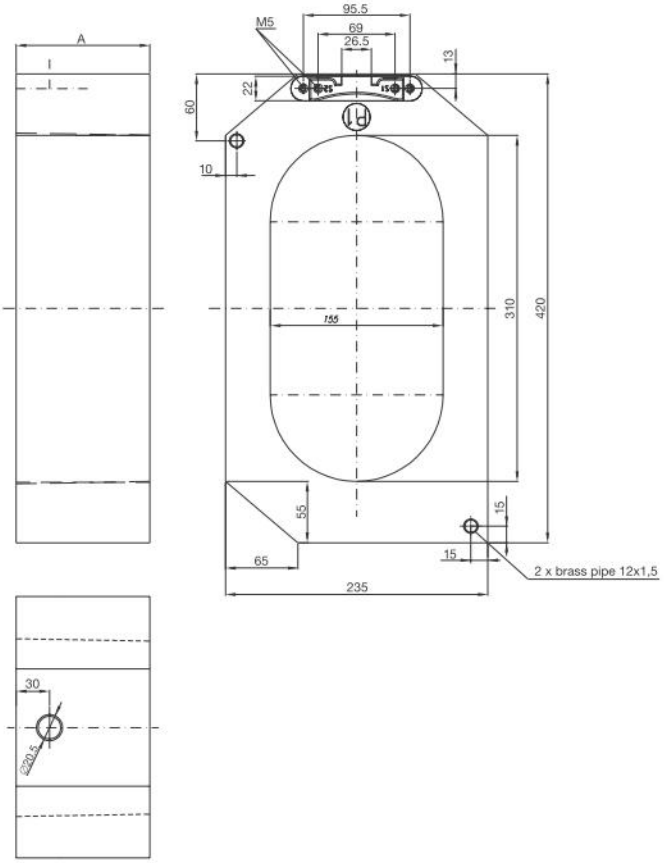
Tabulka 17. Standardní parametry pro KOKM 06 NN_

Primární proud I_{pn} [A]	Maximální povolená zátěž [VA]											
	Sekundární proud I_{sn} = 1 [A]						Sekundární proud I_{sn} = 5 [A]					
	Třída měření FS		Třída ochrany Fa				Třída měření Fs		Třída ochrany Fa			
	0,5	1	10P10	10P20	5P10	5P20	0,5	1	10P10	10P20	5P10	5P20
50	–	–	3,5	1,5	–	–	–	–	3	1	–	–
60	–	–	4	2	–	–	–	–	3,5	1,5	–	–
70	–	–	5	2,5	–	–	–	–	4,5	1,5	–	–
75	–	–	5,5	2,5	–	–	–	–	5	2	–	–
100	–	–	7	3,5	7	1	–	–	6	2,5	6	1
110	–	–	7,5	4	7,5	1,5	–	–	7	3	7	1,5
120	–	–	8	4	8	4	–	–	7	2,5	7	2,5
140	–	–	10	5	10	5	–	–	9	3,5	9	3,5
150	–	–	10	5	10	5	–	–	9	4	9	4
200	–	8	14	7	14	7	–	9	13	5,5	13	5,5
240	–	15	17	8,5	17	8,5	–	16	15	6,5	15	6,5
250	–	19	18	9	18	9	–	19	16	7	16	7
300	–	31	21	10	21	10	–	31	20	8	20	8
350	0,5	50	25	12	25	12	–	50	22	10	22	10
400	15	60	28	13	28	13	15	55	25	11	25	11
500	35	90	34	16	34	16	35	60	31	14	31	14
600	60	90	41	17	41	17	60	90	38	15	38	15
630	60	90	42	18	42	18	60	90	39	16	39	16
800	90	90	52	23	52	23	90	90	49	21	49	21
1000	90	90	66	28	66	28	90	90	63	26	63	26
1200	90	90	80	34	80	34	90	90	77	32	77	32
1250	90	90	82	35	82	35	90	90	79	33	79	33
1500	90	90	90	40	90	40	90	90	90	40	90	40

Na zvláštní přání lze dodat proudové transformátory s jinými hodnotami sekundárního proudu než ve výše uvedené tabulce (např. 4,3 A) a proudové transformátory pro kmitočet 60 Hz.

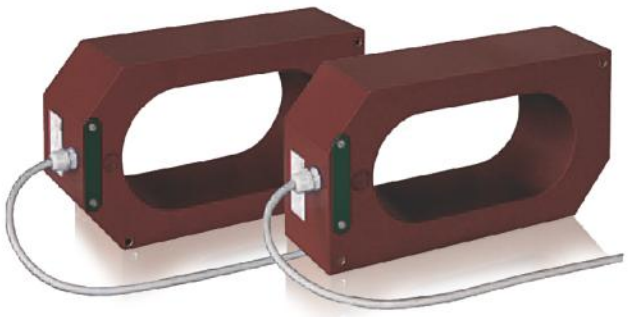
Celkové rozměry

KOKM 06 NN_



Typ	Rozměry [mm]
	A
KOKM 06 NN 6	60
KOKM 06 NN 9	90
KOKM 06 NN 12	120
KOKM 06 NN 14	140
KOKM 06 NN 16	160
KOKM 06 NN 18	180

KOKM 06 LM_ je vnitřní, kabelový, nízkonapěťový proudový transformátor v pryskyřičné izolaci. Tyto typy transformátorů jsou vhodné pro měření fázových proudů. Jako primární vodič slouží přípojnice nebo kabel. Proudové transformátory ze série KOKM lze rovněž použít pro měření fázových proudů při napětích vyšších než 0,72 kV, pokud izolace vysokonapěťového primárního vodiče splňuje požadavky příslušných norem pro dané pracovní napětí.



Tabulka 18. Technická data

Typ	KOKM 06 LM_
Max. počet vinutí	2
Izolační hladina	0,6/3/-
Nejvyšší povolené napětí proudového transformátoru U_r	0,72 kV
Jmenovité zkušební napětí izolace (50 Hz, 1 min U_p)	3 kV
Jmenovitý kmitočet	50 Hz
Jmenovitý tepelný proud	1,2 x I_{pn}
Krátkodobý výdržný tepelný proud I_{th}, 1 s	60 x I_{pn}
Jmenovitý dynamický proud I_{dyn}	2,5 x I_{th}
Rozsah provozní teploty	-5 ... +40 °C
Soulad s normami	IEC, ANSI, PN-EN, CAN

Porovnání KOKM 06 NN_ a KOKM 06 LM_

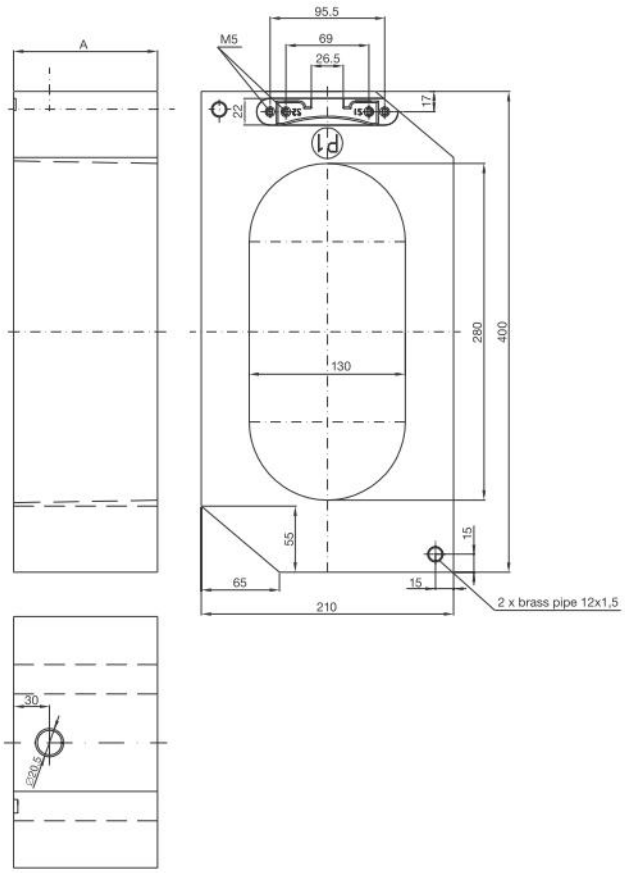
Tabulka 19. Standardní parametry pro KOKM 06 LM_

Primární proud I_{pn} [A]	Maximální povolená zátěž [VA]											
	Sekundární proud I_{sn} = 1 [A]						Sekundární proud I_{sn} = 5 [A]					
	Třída měření FS		Třída ochrany Fa				Třída měření Fs		Třída ochrany Fa			
	0,5	1	10P10	10P20	5P10	5P20	0,5	1	10P10	10P20	5P10	5P20
50	–	–	3,5	1,5	–	–	–	–	3	1	–	–
60	–	–	3,5	1,5	–	–	–	–	3,5	1,5	–	–
70	–	–	5	2,5	–	–	–	–	4,5	1,5	–	–
75	–	–	5	2,5	5	–	–	–	5	2	–	–
100	–	–	7	3,5	5	1,5	–	–	6	2,5	6	1,5
110	–	–	8	4	8	3,5	–	–	7	3	7	2,5
120	–	–	8	4	8	4	–	–	7	3	7	3
140	–	–	10	5	10	5	–	–	9	3,5	9	3,5
150	–	–	11	5	11	5	–	–	9	4	9	4
200	–	11	13	7	13	7	–	11	13	5,5	13	5,5
240	–	20	16	8,5	16	8,5	–	20	15	6,5	15	6,5
250	–	23	18	9	18	9	–	23	16	7	16	7
300	–	35	21	10	21	10	–	35	20	8	20	8
350	12	55	25	12	25	12	12	55	22	10	22	10
400	20	60	28	13	28	13	20	60	25	11	25	11
500	40	90	34	16	34	16	40	90	31	14	31	14
600	60	90	41	17	47	17	60	90	38	15	38	15
630	60	90	42	18	42	18	60	90	39	16	39	16
800	90	90	52	23	52	23	90	90	49	21	49	21
1000	90	90	66	28	66	28	90	90	63	23	63	23
1200	90	90	80	34	80	34	90	90	77	32	77	32
1250	90	90	82	35	82	35	90	90	79	33	79	33
1500	90	90	90	40	90	40	90	90	90	40	90	40

Na zvláštní přání lze dodat proudové transformátory s jinými hodnotami sekundárního proudu než ve výše uvedené tabulce (např. 4,3 A) a proudové transformátory pro kmitočet 60 Hz.

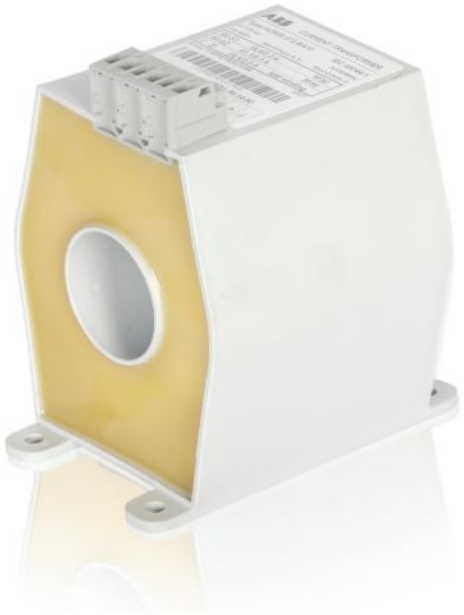
Celkové rozměry

KOKM 06 LM_



Typ	Rozměry [mm]
	A
KOKM 06 LM 6	60
KOKM 06 LM 9	90
KOKM 06 LM 12	120
KOKM 06 LM 14	140
KOKM 06 LM 16	160
KOKM 06 LM 18	180

Kabelové proudové transformátory vnitřní typ KOKM (pro RMU)



KOKM 072 BA 10, CA 10 – Tyto typy vnitřních proudových transformátorů s kruhovým jádrem slouží k napájení měřících a ochranných zařízení maximálním jmenovitým napětím 0,72 kV s jmenovitým kmitočtem 50 nebo 60 Hz. Lze je montovat dovnitř rozváděčů. Doporučená jmenovitá teplota při přepravě a skladování těchto transformátorů je v rozsahu +5°C ... +40 °C. Sekundární obvody by se měly instalovat pomocí měděných vodičů o průřezu nejméně 2,5 mm^2. Schémata zapojení pro měření proudu a energie jsou na str. 30 a 31.

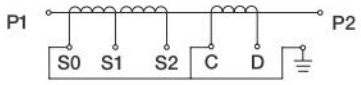
Tabulka 20. Elektrické parametry

Typ	KOKM 072 BA 10	KOKM 072 CA 10	KOKM 072 CA 10	KOKM 072 CA 10	KOKM 072 CA 10	KOKM 072 CA 10
Počet vinutí pro měření	2 ks. (svorky S0-S1-S2 137 závitů (48+89))	2 ks. (svorky S0-S1-S2) 1116 závitů (391+725)	1 ks. (svorky S1-S2 187 závitů)	1 ks. (svorky S1-S2 381 závitů)	1 ks. (svorky S1-S2 765 závitů)	1 ks. (svorky S1-S2 1535 závitů)
Počet vinutí pro zkoušku	1 ks. (svorky C-D 48 závitů)	1 ks. (svorky C-D 391 závitů)	1 ks. (svorky C-D 50 závitů)	1 ks. (svorky C-D 100 závitů)	1 ks. (svorky C-D 200 závitů)	1 ks. (svorky C-D 400 závitů)
Jmenovitá izolační hladina	0,72/3/-	0,72/3/-	0,72/3/-	0,72/3/-	0,72/3/-	0,72/3/-
Nejvyšší napětí pro zařízení U_m	0,72 kV	0,72 kV	0,72 kV	0,72 kV	0,72 kV	0,72 kV
Jmenovité výdržné napětí při síťovém kmitočtu (r.m.s.)	3 kV	3 kV	3 kV	3 kV	3 kV	3 kV
Jmenovitý kmitočet f_n	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Jmenovitý primární proud I_{pn}	14,4 – 41,1 A	117,4 - 335 A	14,4 A	28,8 A	57,6 A	115,2 A
Jmenovitý sekundární proud I_{sn}	0,3 A	0,3 A	0,075 A	0,075 A	0,075 A	0,075 A
Zkušební vinutí	0,3 A	0,3 A	0,288 A	0,288 A	0,288 A	0,288 A
Třída přesnosti s relé typu MPRB / WIC1	5P30	5P30	10P80	5P80	5P80	5P80
Jmenovitá zátěž			0,1 VA	0,1 VA	0,1 VA	0,1 VA
Jmenovitý kontinuální tepelný proud Icth	4 x I_{pn} (ext. 400%)	4 x I_{pn} (ext. 400%)	10 x I_{pn} (ext. 1000%)	10 x I_{pn} (ext. 1000%)	10 x I_{pn} (ext. 1000%)	10 x I_{pn} (ext. 1000%)
Jmenovitý krátkodobý tepelný proud I_{th} 1 s	100 x I_{pn} A	100 x I_{pn} A	20 kA	20 kA	20 kA	20 kA
Jmenovitý dynamický proud I_{dyn}	2,5 x I_{th} A	2,5 x I_{th} A	62,5 kA	62,5 kA	62,5 kA	62,5 kA
Třída izolace	E	E	E	E	E	E
Krytí	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20
Vnější rozměry Prům.xprům.xDxV	100x42x100x124	100x50x100x124	100x50x100x124	100x50x100x124	100x50x100x124	100x50x100x124
Hmotnost	3,3	2,8	2,27	1,9	1,4	1,7
Rozsah provozní teploty	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Soulad s normami	IEC 60044-1	IEC 60044-1	IEC 60044-1	IEC 60044-1	IEC 60044-1	IEC 60044-1

Značení svorek

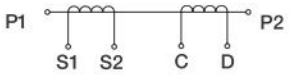
KOKM 072 BA 10 = MPTA 96-14-90

Svorky	Poměr	Třída	Počet vinutí
S0 – S1	14,4/0,3 A	5P30	48
S0 – S2	41,1/0,3 A	5P30	137 (48+89)
C – D	0,3 A	zkušební vinutí	48



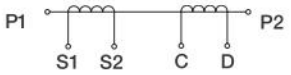
KOKM 072 CA 10 pro REJ 603*

Svorky	Poměr	Zátěž	Třída	Počet vinutí
S1 – S2	14,4/0,075 A	0,1 VA	10P80	187
C – D	0,288 A	zkušební vinutí		50



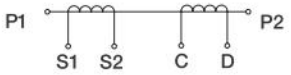
KOKM 072 CA 10 pro REJ 603*

Svorky	Poměr	Zátěž	Třída	Počet vinutí
S1 – S2	28,8/0,075 A	0,1 VA	5P80	381
C – D	0,288 A	zkušební vinutí		100



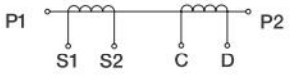
KOKM 072 CA 10 pro REJ 603*

Svorky	Poměr	Zátěž	Třída	Počet vinutí
S1 – S2	57,6/0,075 A	0,1 VA	5P80	765
C – D	0,288 A	zkušební vinutí		200



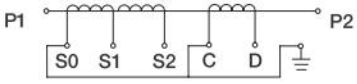
KOKM 072 CA 10 pro REJ 603*

Svorky	Poměr	Zátěž	Třída	Počet vinutí
S1 – S2	115,2/0,075 A	0,1 VA	5P80	1535
C – D	0,288 A	zkušební vinutí		400



KOKM 072 CA 10 = MPTA 96-117-737

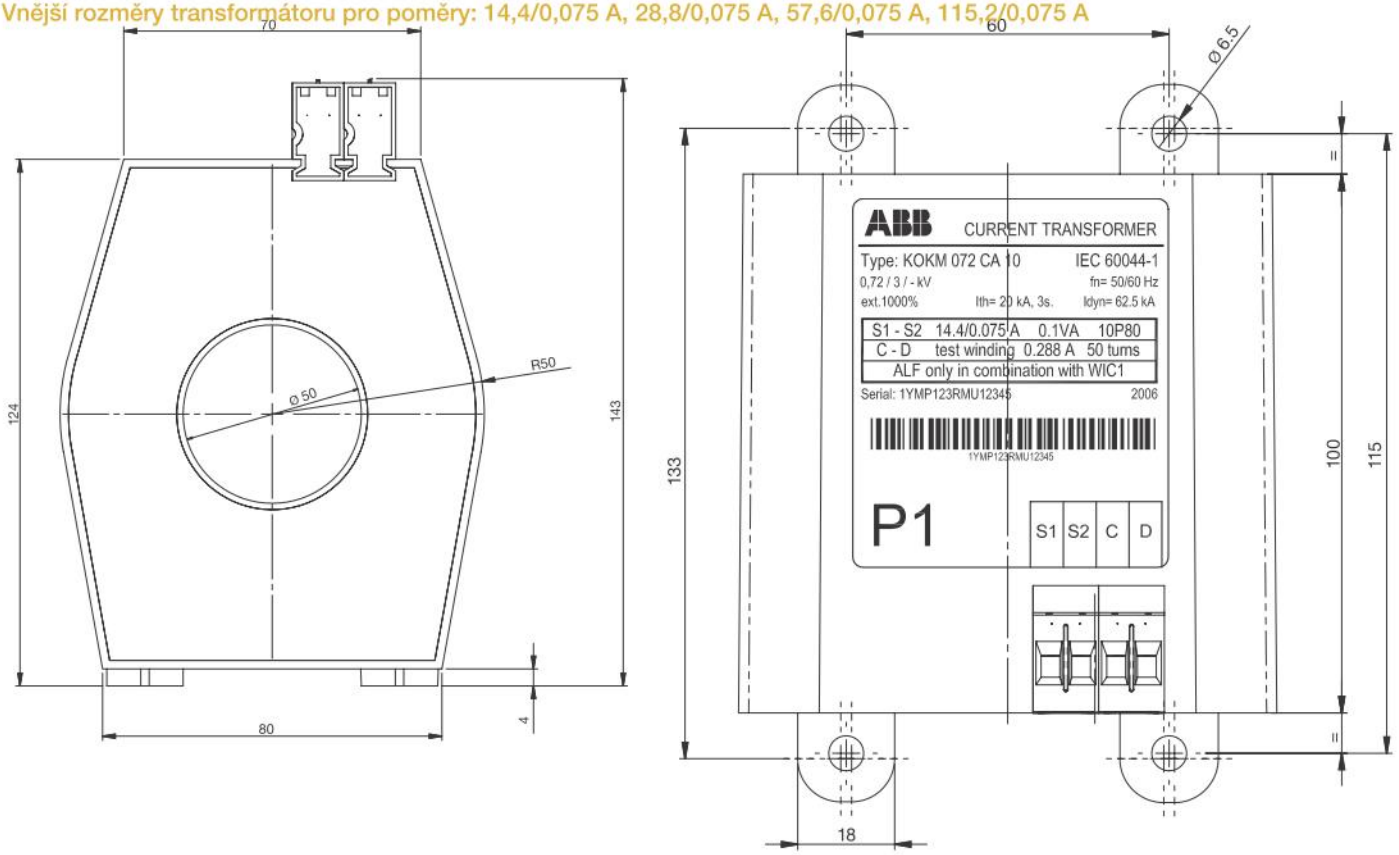
Svorky	Poměr	Třída	Počet vinutí
S0 – S1	117,4/0,3 A	5P30	391
S0 – S2	335/0,3 A	5P30	1116 (391+725)
C – D	0,3 A	zkušební vinutí	391

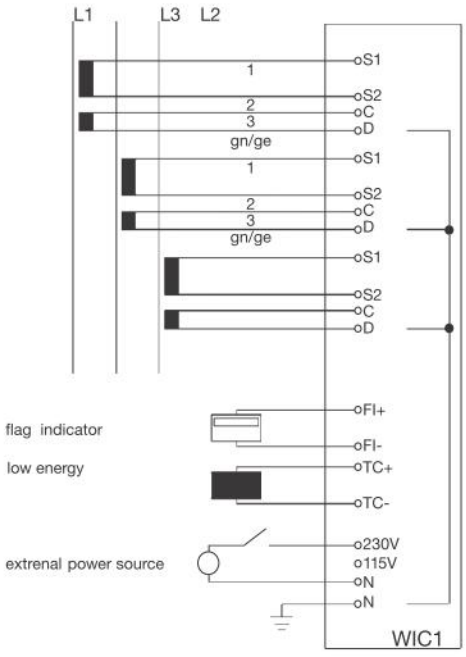


*nebo jiná relé od jiného výrobce než ABB, např. WIC

Celkové rozměry, schéma zapojení

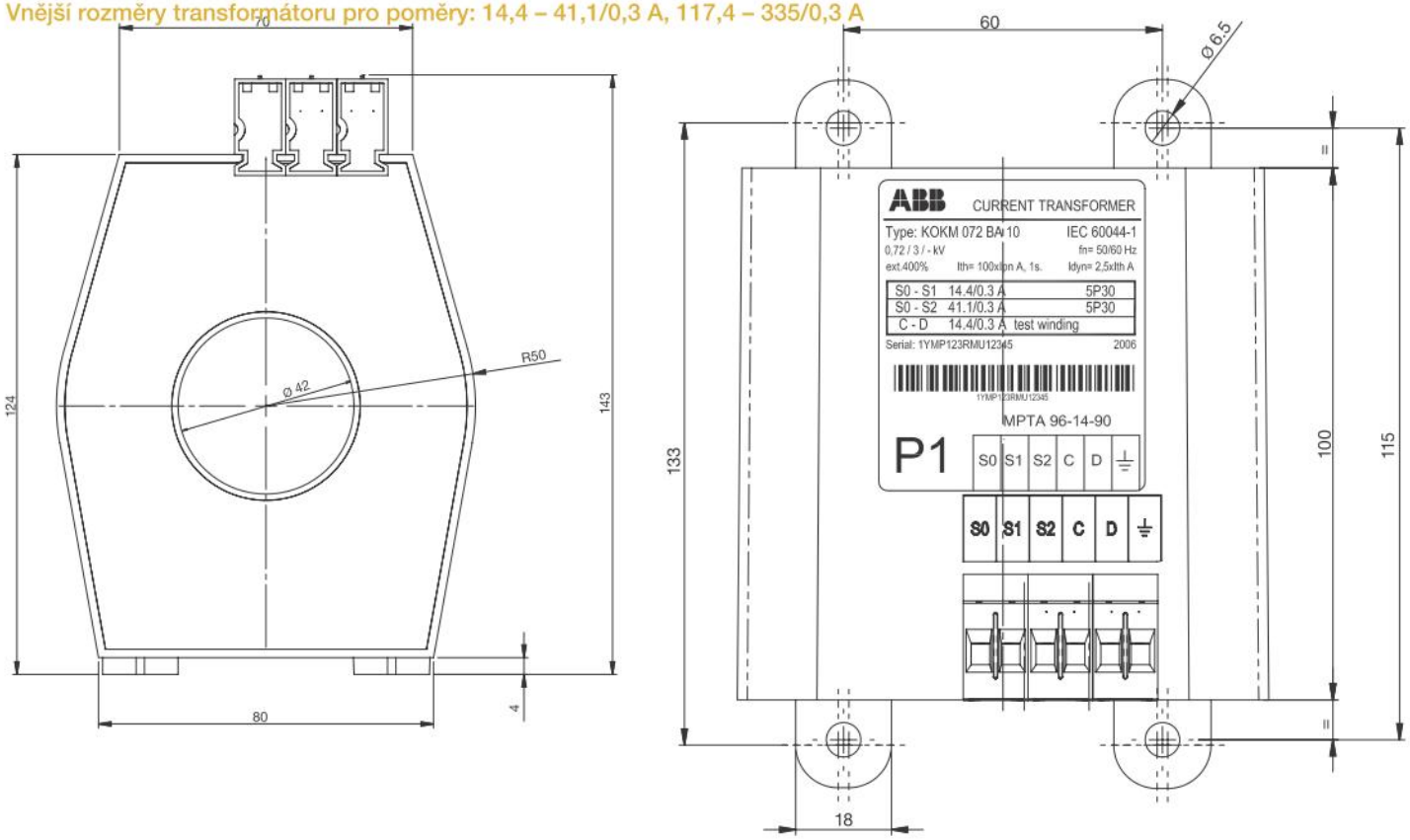
Vnější rozměry transformátoru pro poměry: 14,4/0,075 A, 28,8/0,075 A, 57,6/0,075 A, 115,2/0,075 A

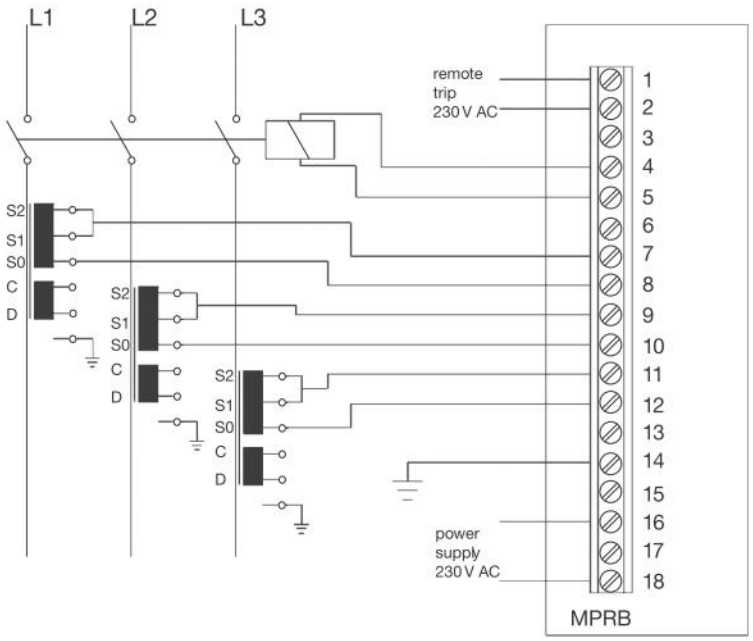


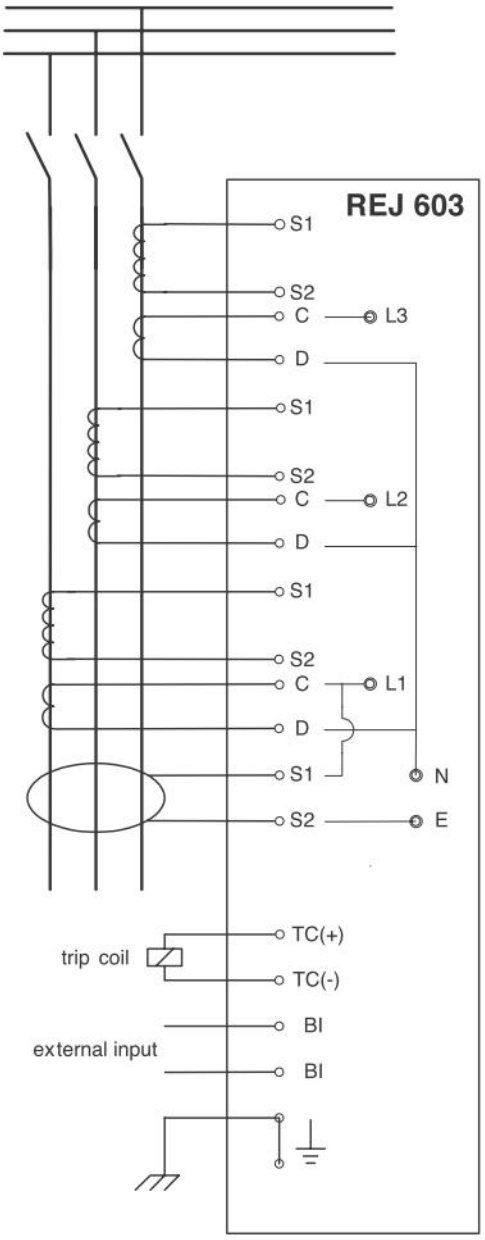


Celkové rozměry, schéma zapojení

Vnější rozměry transformátoru pro poměry: 14,4 – 41,1/0,3 A, 117,4 – 335/0,3 A







Číslo produktu	Typ proudového transformátoru	Primární proud I_{pn} [A]	Sekundární proud I_{sn} [A]	
1YMA183190R0001	KOKM 072 CA 10	14,4 A	0,075 A	pro REJ 603 - CT2
1YMA183190R0002	KOKM 072 CA 10	28,8 A	0,075 A	pro REJ 603 - CT3
1YMA183190R0003	KOKM 072 CA 10	57,6 A	0,075 A	pro REJ 603 - CT4
1YMA183190R0004	KOKM 072 CA 10	115,2 A	0,075 A	pro REJ 603 - CT5
1YMA183190R0005	KOKM 072 CA 10	117,4 - 335 A	0,3 A	
1YMA183190R0006	KOKM 072 BA 10	14,4 – 41,1 A	0,3 A	

Příklad objednávky

KOKM 072 CA 10 (1YMA183190R0003); 57.6/0.075 A/A; 0.1 VA; 5P80; I_{th}= 20 kA/1s; IEC 60044-1; 21 ks.

Speciální proudové transformátory vnitřní
typ KORI 072 GH 8

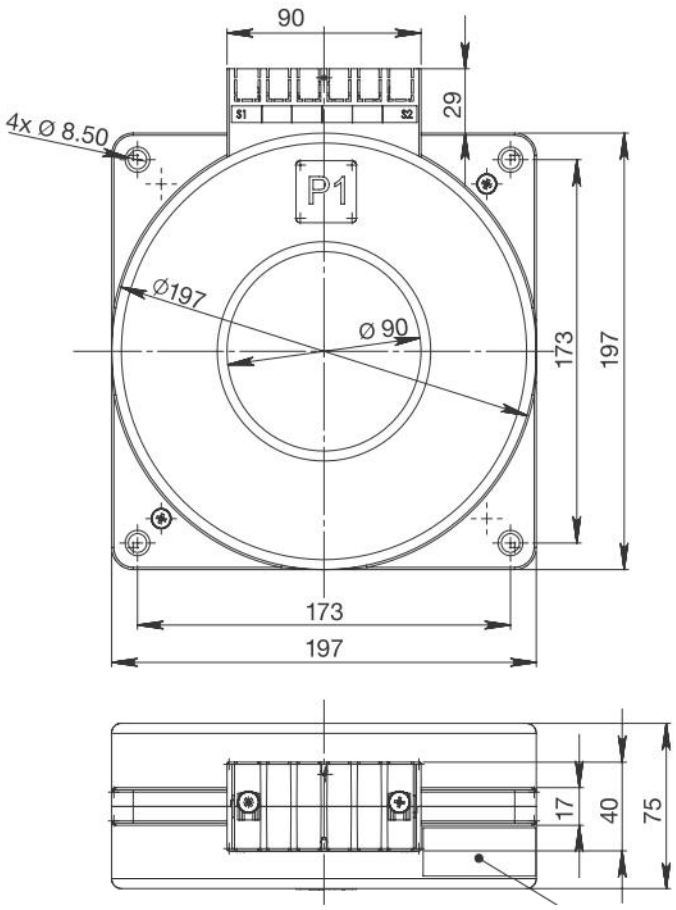
KORI 072 GH 8 – Nízkonapěťový přístrojový proudový transformátor bez primárního vodiče, které lze namontovat na průchodku rozváděče pomocí vlastní izolace. Transformátory tohoto typu umožňují ochranu a jsou určeny pro použití ve vnitřních instalacích. Transformátory KORI072 GH 8 jsou obecně konstruovány s jedním převodovým poměrem. Mohou však mít i více převodových poměrů, pokud je možnost je přepojit na sekundární straně.
Postup montáže transformátorů na průchodky rozváděcího panelu UniGear 550 je přesně stanoven.
Všechny transformátory vyhovují příslušné normě, tj. IEC 60044-1.

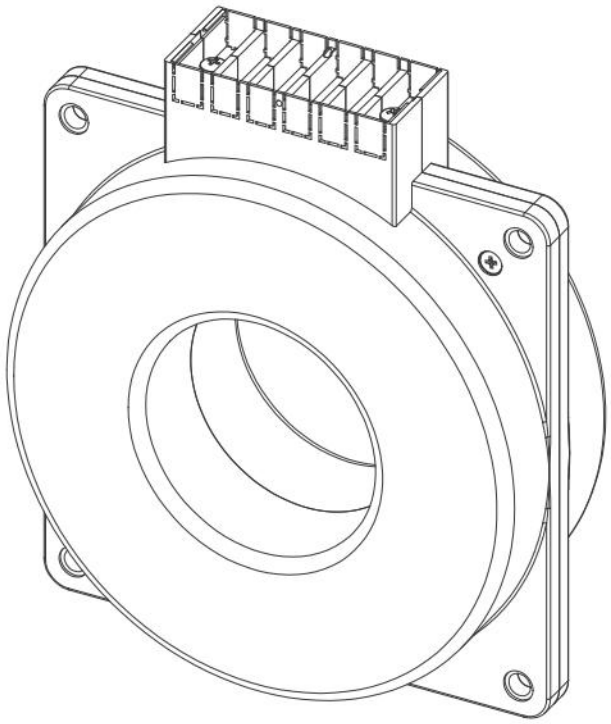
Tabulka 21. Technická data

Typ (nízkonapěťový proudový transformátor pro VN aplikace)			KORI
Nejvyšší napětí pro zařízení	U_m	[kV]	0,72
Napětí pro zkoušku při síťovém kmitočtu	U_p (1 min)	[kV]	3
Jmenovitá izolační hladina		[kV]	0,72/3/–
Jmenovitý kmitočet	f_n	[Hz]	50
Jmenovitý primární proud	I_{pn}	[A]	1 600 až 2 500
Jmenovitý sekundární proud	I_{sn}	[A]	1 nebo 5
Jmenovitý krátkodobý tepelný proud	I_{th} (3 s)	[kA]	50,0
Jmenovitý dynamický proud	I_{dyn}	[kA]	125,0
Třídy přesnosti			5P20
Zátěž	Sn	[VA]	10, 15, 20, 25 nebo 30
Nejvyšší napětí systému		[kV]	12 – 17.5 kV při použití CT ROD
Třída hořlavosti			B
Proudové transformátory KORI 072 GH 8 jsou určeny pro rozváděče ABB typu Unigear 550.			

Jiné parametry je nutno zkonzultovat s výrobcem a budou posouzeny individuálně.
Možné jsou i varianty umožňující opětovné zapojení, ale je třeba je posoudit individuálně (na základě požadavku zákazníka a dohody s výrobcem).

Celkové rozměry





Proudové transformátory
typ KOLT (pro olejové transformátory)

KOLT – tento typ transformátorů nemá kryt a primární vinutí. V provozních podmínkách slouží průchodkový izolátor, což je hlavní izolace proudového transformátoru, i jako primární vinutí. Sekundární vinutí jsou rovnoměrně navinuta na obvod toroidního jádra. Izolace sekundárního vinutí je zhotovena z polyesterové pásky (torlen).

Proudové transformátory o hmotnosti 100 kg nebo více jsou složeny z několika částí pro usnadnění dopravy i montáže. Jednotlivé části jsou označeny sériovým číslem odpovídajícím číslu na výkonovém štítku a značkami pro svorky primárního a sekundárního vinutí.

Tabulka 22. Technická data

Typ			KOLT
Rozsah primárního proudu	I_{pn}	[A]	100 A - 15 000 A
Jmenovitý sekundární proud	I_{sn}	[A]	1A ÷ 5A
Izolační hladina		[kV]	0,72/3/-
Rozsah jmenovitého výkonu	Sn	[VA]	1 VA -90 VA
Počet vinutí			1 - 4
Soulad s normami			IEC, PN-EN, SEV, VDE, ANSI, BS, CAN, CSA, GOST
Třída přesnosti podle IEC			0.2s; 0.5s; 0.2; 0.5; 1; 3; 5; 5P; 10P; PX
FS			5; 10
ALF			5; 10; 15; 20; 25; 30
Jmenovitý kmitočet	f	[Hz]	50, 60
Krátkodobý výdržný tepelný proud	I_{th} (1 s)	[A]	100 x I_{pn} max. 100 kA
Dynamický výdržný proud	I_{dyn}	[A]	2,5 x I_{th} max. 250 kA
Třída izolace podle IEC			B
Min. vnitřní průměr	Ø A	[mm]	min. 30 mm podle parametrů
Max. vnější průměr	Ø B	[mm]	max. 900 mm podle parametrů
Výška	h	[mm]	max. 900 mm podle parametrů
Délka vývodů	D	[mm]	1 m, jiné délky na přání zákazníka

Transformátory jiných rozměrů a parametrů jsou k dispozici na požádání.

Dostupné verze

– jednofázové
– s jedním nebo několika vinutími
– s jednou nebo několika odbočkami
– izolace – bavlněná páska + impregnační lak
– bez krytu
– bez primárního vinutí

Použití

Proudové transformátory typu KOLT se montují dovnitř výkonových transformátorů. Pracují v olejové lázni a za mírných a tropických klimatických podmínek. Tyto proudové transformátory jsou určeny k napájení měřicích a ochranných obvodů silových systémů pracujících pod jmenovitým kmitočtem 50 Hz.

Značení

Každý proudový transformátor je opatřen výkonovým štítkem v souladu s normou IEC 60044-1. Hodnoty jmenovitého napětí a jmenovitého zkušebního napětí izolace při síťovém kmitočtu (uvedeno na výkonovém štítku) se týkají izolace sekundárních vinutí. Primární a sekundární svorky jsou označeny přímo na proudovém transformátoru.

Doprava

Během přepravy je nutno chránit proudové transformátory před vlhkem a prudkými otřesy. Proudové transformátory o hmotnosti vyšší než 50 kg a proudové transformátory obzvlášť citlivé na otřesy se přepravují na dřevěných paletách.

Montáž

Při montáži proudových transformátorů je třeba dodržovat následující pokyny:
– sekundární vinutí označené 1S1- 1S2 musí být umístěno nahoře
– všechny části proudového transformátoru musí mít stejnou polarizaci (značky P1 – P2 – P1 – P2)
– vyhýbejte se otřesům

Soulad s normami

Proudové transformátory vyhovují následujícím normám:
IEC 60044-1
Na přání zákazníka vyrábíme proudové transformátory vyhovující normám SEV, VDE, ANSI, BS, CAN, CSA, GOST.

Záruka

Záruka je poskytována po dobu dvou let ode dne zahájení provozu transformátoru. Maximálně však po dobu tří let od zakoupení. Záruka se týká pouze výrobních vad a nevztahuje se na závady vzniklé v důsledku:
– nevhodné dopravy
– nesprávného skladování
– nedodržení pokynů během montáže a provozu
– nesprávného výběru transformátoru pro danou elektrickou soustavu.

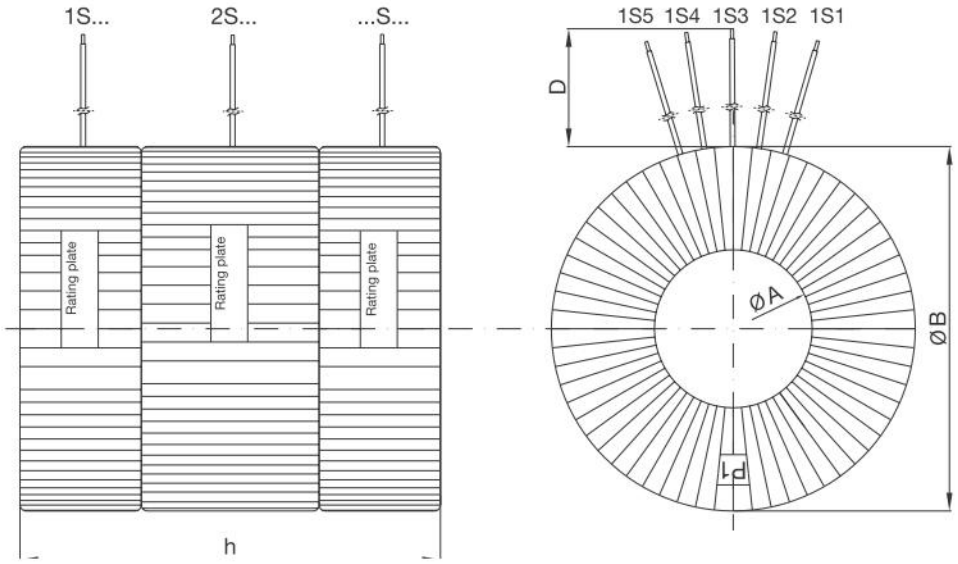
Objednávání

Objednávka musí obsahovat následující údaje:
– název a typ proudového transformátoru
– jmenovitý primární proud / jmenovitý sekundární proud I_{pn}/I_{sn} [A]
– krátkodobý tepelný proud, 1 s I_{th} [kA]
– jmenovitý výkon a třídu přesnosti pro každé vinutí Sn [VA]
– mezní rozměry transformátoru (min. vnitřní průměr, max. vnější průměr, max. výška)
– délku vývodů
– normu
– množství

Příklad objednávky

Typ proudového transformátoru KOLT
1200/5/1/1 A
I_{th} = 72 kA
I. 15 VA, třída 0.5 FS10
II. 60 VA, třída 5P15
III. 60 VA, třída 5P20
Min. vnitřní průměr A = ø150 mm
Max. vnější průměr B = ø300 mm
Max. výška = 200 mm
Délka vývodů 1,5 m
Norma IEC 60044-1
Množství – 9 ks.

Celkové rozměry



Napište nám

ABB
PPMV Brno
Vídeňská 117
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Table of contents

1. General characteristics

PowerCube module type PB/M

PowerCube enclosure type PB/E

PowerCube L-frame type PB/F

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General information

PowerCube modules can be used to develop and assemble metalclad medium voltage air-insulated switchgear with the same rated current values as the enclosure.
The rated currents of the enclosures refer to versions tested in ABB UniSafe switchgear.
Use of the 4000 A PB3 enclosure allows a switchgear with the same rated current to be made so long as a suitable fan is installed in the rear part of the switchgear itself (consult ABB for further details).
PowerCube units type PB are available in three different versions: PB/M, PB/E and PB/F or PB/FL.
PB/M: complete module that also includes the cable access cubicle, which can also be pre-engineered to house the withdrawable TV compartment.
PB/E: enclosure without cable access compartment thus unable to house the withdrawable VT which, being smaller in size, is more flexible and suitable for creating double-deck switchgear.
PB/F: L-frame without door and cable access compartment thus unable to house the withdrawable VT cell or truck, which, being smaller in size, is more flexible and suitable for creating double-deck switchgear.
PB/FL: it is a compact version of PB/F which does not allow usage of the earthing switch
PowerCube modules are pre-assembled and tested in the factory. They can be used to make switchgear conforming to Standards IEC 62271-200, IEC 62271-1.

They are available with the following specifications:

Rated voltage (kV)	... 17.5	24
Rated current (A)	... 4000	... 2500
Rated short-time withstand current of main circuit (kA)	... 40 x 3s	... 31.5 x 3s
	... 50 x 1s	

The following apparatus can be installed in PowerCube modules:

- series VD4, VM1 and VD4-G vacuum circuit breakers
- series ConVac vacuum contactors

All the switching operations are carried out from the front of the module/enclosure.

Protection class

PowerCube PB/M and PB/E units can guarantee a degree of protection IP4X according IEC 60529 from front and with door closed.
The degree of protection from top, bottom, left and right side is dependent on complete panel design and therefore at customer care, this is in general applicable to PB/F and PB/FL units as are open L-frames

Interlocks

The PowerCube module is equipped with interlocks in order to prevent incorrect operations that could put the operators' safety at risk and compromise the efficiency and reliability of the actual equipment. These interlocks inhibit the following operations:

- closing of the circuit-breaker unless the connected or isolated positions are reached.
- rack-out of the closed circuit-breaker.
- rack-in of the closed circuit-breaker
- door opening if the circuit-breaker is in rack-in position or halfway between rack-in and isolated position.
- rack-in of the circuit-breaker when the compartment door is open
- manual opening of the shutters.

Moreover, if the unit is equipped with an earthing switch:

- closing of the earthing switch if the circuit-breaker is in rack-in position or halfway between rack-in and isolated position
- rack-in of the circuit-breaker with the earthing switch closed.
- opening of the feeder compartment door with the earthing switch open (PowerCube PB/M module only)
- opening of the earthing switch with the feeder compartment door open (PowerCube PB/M module only).

Note: some of the above mentioned interlocks are available on request or only available for certain versions.


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ABB S.p.A. - EPDS Electrification Products - Distribution Solutions
ISO 45001:2018

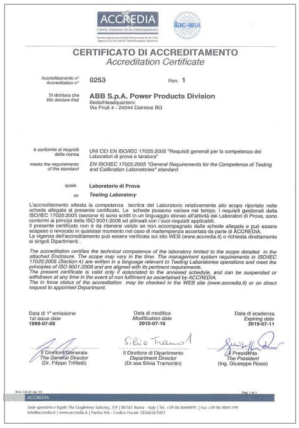
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ABB S.p.A. Power Products Division

Quality System

Conforms to ISO 9001 Standards, certified by an independent body.

Test laboratory

Conforms to ISO 45001 Standards, certified by an independent body.

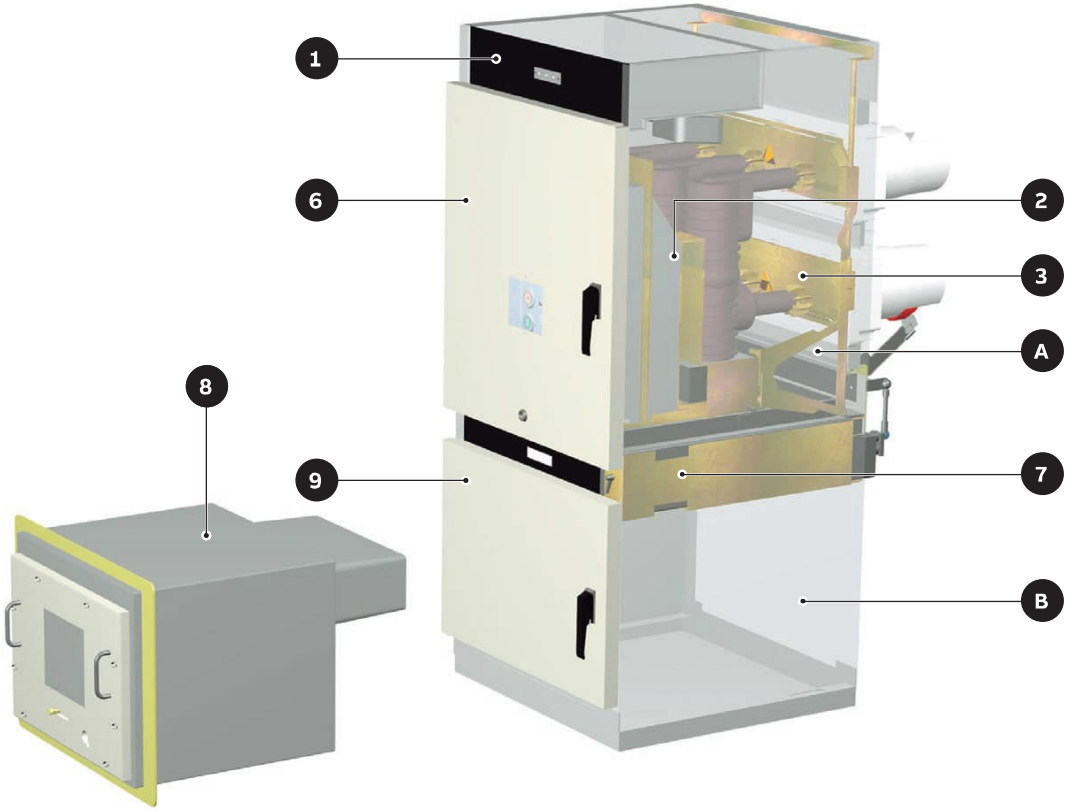
Environmental Management System

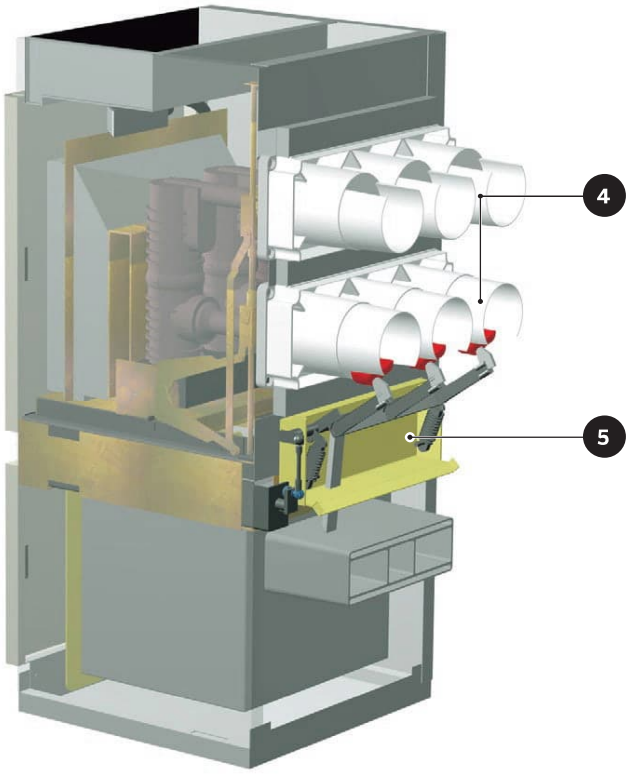
Conforms to ISO 14001 Standards, certified by an independent body.

Health and Safety Management System

Conforms to ISO 45001: 2018 Standards, certified by an independent body.

1. General characteristics





A Circuit-breaker compartment
1 Voltage signalling device (on request - for PowerCube PB/M only)
2 Circuit-breaker/contactor/trolley
3 Metal shutters
4 Lower and upper monoblocs
5 Earthing switch (on request)
6 Door
7 Fan (only for PB3 size 3600 A and 4000 A and for PB5 size 2500 A)

B Feeder compartment
8 TV compartment (on request - for PowerCube PB/M only)
9 Door

Electrical specifications of PowerCube unit

PowerCube type			PB1	PB2	PB3 [3]	PB4	PB5 [2]	PB1/R [2]	PB2/R [2]	PB3/R [2]	PB4/R [2]	PB5/R [2]	PB1/T	PB2/T	PB4/T
Module width		mm	600	750	1000	750	1000	600	750	1000	750	1000	600	750	750
Rated voltage	12	kV	•	•	•			•	•	•			•	•	
	17.5	kV	•	•	•			•	•	•			•	•	
	24	kV				•	•				•	•			•
Test Voltage at industrial frequency	28	kV	•	•	•			•	•	•			•	•	
	38	kV	•	•	•			•	•	•			•	•	
	50	kV				•	•				•	•			•
Impulse withstand voltage	75	kV	•	•	•			•	•	•			•	•	
	95	kV	•	•	•			•	•	•			•	•	
	125	kV				•	•				•	•			•
Short-time withstand current	25	kA (3s)	•	•	•	•	•								
	31.5	kA (3s)	•	•	•	•	•								
	40	kA (3s)		•	•										
	50	kA (1s)		•	•										
Peak current	63	kA	•	•	•	•	•								
	79	kA	•	•	•	•	•								
	100	kA		•	•										
	125	kA		•	•										
Rated currents	630	A	•	•		•									
	1250	A	•	•		•									
	1600	A		•			•								
	2000	A		•			•								
	2500	A			•		• (1)								
	3150	A			•										
	3600	A			• (1)										
	4000	A			• (1)										

Not applicable

Electrical specifications of the earthing switch (on request)

PowerCube Module/Enclosure			PB1	PB2	PB3	PB4	PB5	PB1/R	PB2/R	PB3/R	PB4/R	PB5/R	PB1/T	PB2/T	PB4/T
Module width		mm	600	750	1000	750	1000	600	750	1000	750	1000	600	750	750
Short-time withstand current	25	kA (3s)	•	•	•	•	•	•	•	•	•	•	•	•	•
	31.5	kA (3s)	•	•	•	•	•	•	•	•	•	•	•	•	•
	40	kA (1s)		•	•				•	•				•	
	50	kA (1s)		•	•				•	•				•	
Peak current	63	kA	•	•	•	•	•	•	•	•	•	•	•	•	•
	79	kA	•	•	•	•	•	•	•	•	•	•	•	•	•
	100	kA		•	•				•	•				•	
	125	kA		•	•				•	•				•	

(1) With forced ventilation in the circuit-breaker compartment: a further fan is required at the rear of the switchgear for 4000 A versions.
(2) PB/F and PB/FL not available
(3) PB/FL not available

2. Available types and apparatus

Circuit breakers

Note: see relevant apparatus catalogue for rating and versions suitable for PB untis

VD4 series vacuum circuit breaker.

Scan o Tap on QR code to visit ABB VD4 website.

VM1 series vacuum circuit breaker

Scan o Tap on QR code to visit ABB VM1 website.

VD4G series Vacuum circuit breaker.

Scan o Tap on QR code to visit ABB VD4G website.

PowerCube Units can be equipped with VD4, VM1 and VD4G series withdrawable vacuum circuit-breakers.
The circuit breakers are fitted with a truck which allows their racking-in and out of the switchgear with the door closed.
They have a compact and light structure which ensures great sturdiness and excellent mechanical reliability.
The operating mechanism and poles are fixed to the metal structure which also acts as a support for the moving contact actuation kinematics

Series VD4, VM1 and VD4G vacuum circuit-breakers

The VD4, VD4G and VM1 circuit breakers use vacuum as interruption and insulating medium.
Thanks to the advanced techniques used for their manufacturing, the vacuum circuit breakers ensure high performances under all service conditions.
The vacuum interrupters are embedded in thermoplastic or epoxy resin poles.
This construction protect the vacuum interrupters which are unaffected by shocks, humidity and environmental pollution.
The circuit breaker poles, constitute the interrupting part, they are sealed for life pressure systems (IEC 62271-100 Standards) and maintenance-free.
The VD4 and VD4G circuit breakers use a mechanical type of operating mechanism while VM1 circuit breakers use an operating mechanism with a magnetic actuator.
VD4G circuit breakers are designed to meet the most demanding plant requirements for generator applications as for IEEE C37.013 and the new revision of IEC/IEEE 62271-C37-013 standards (dual logo).

Series ConVac vacuum contactor

Scan o Tap on QR code to visit ABB ConVac website.

Series ConVac vacuum contactors

ConVac series withdrawable contactors are used in PowerCube PB1 Units up to 12 kV. The contactors are suitable for controlling a.c. devices that need to a considerable number of operations with an extremely low chopping current.

The Contactor is characterized by a monostable linear actuator and available in two basic configuration, Electrical latching and mechanical latching. Close operation is always performed supplying the multi-voltage electronic feeded which reduce automatically power consumption after the close operation without the need of added resistances.

In electrically latched units, when auxiliary power supply is not present, open operation is guaranteed by springs. In mechanically latched units, after the closing operation is performed, the power supply is removed and a mechanical device lock the contactor in close position until a trip coil is energized. When this happen the mechanical lock disengage and the contactor open by springs.

The contactor is suitable to install both DIN and BS fuses (type to be specified at order stage) with different lenghts.

ConVac contactors are also characterized by an extreme flexibility in term of configuration, for instance it is possible for the customer to switch from electrical to mechanical latching, or to change contactor auxiliary voltage level, without ABB intervention by means of a simple kit. This allow to optimize and reduce spare contactors units and spare parts management and to fast adapt to changes in specifications.

2. Available types and apparatus

PB/TM

PB1/MWL

VT trucks

PTT/W is the VT truck used in PB/T measuring unit (see table 1).
VT truck is supplied without voltage transformers (separately available from ABB)
ABB Voltage Transformers suitable for these units are:

- ABB TJP-F 4.0 (12 kV)
- ABB TJP-F 5.0 (17,5 kV)
- ABB TJP 6.0 (24 kV)

PTT/WL is the VT truck used in PB1/MWL measuring unit (see table 2).
VT truck is supplied without voltage transformers (separately available from ABB)
ABB Voltage Transformers suitable for these units are:

- ABB TJP-F 4.0 (12 kV)
- ABB TJP-F 5.0 (17,5 kV)

Tab. 1 – VT trucks for PB/TM, PB/TE and PB/TF

kV	Isc/ Icw (kA)	Dimensions	Truck type	PowerCube
12 17.5	16 20 25 31.5	W=600 mm (panel width) P=150 mm (pole distance VT)	PTT1/W	PB1/TM PB1/TE PB1/TF
12 17.5	40 50	W=750 mm (panel width) P=210 mm (pole distance VT)	PTT2/W	PB2/TM PB2/TE PB2/TF
24	16 20 25 31.5	W=750 mm (panel width) P=210 mm (pole distance VT)	PTT4/W	PB4/TM PB4/TE PB4/TF

Tab. 2 – VT trucks for PB/MWL

kV	Isc/ Icw (kA)	Dimensions	Truck type	PowerCube
12 17.5	16 20 25 31.5	W=600 mm (panel width) P=160 mm (pole distance VT)	PTT1/WL	PB1/MWL

TV cell

VT Cell

TV-F and TV-W are cells for VT placed in PB/M and PB/RM cable compartment

VT truck is fit inside the cell without voltage transformers (separately available from ABB)

ABB Voltage Transformers suitable for these units are:

- ABB TJP 4.3 (12 kV)
- ABB TJP 5.3 (17,5 kV)
- ABB TJP 6.3 (24 kV)

The voltage transformers are are protected by fuses. The fuses can be replaced when the switchgear is in service since the fuse compartment is segregated from the other compartments by metal partitions.

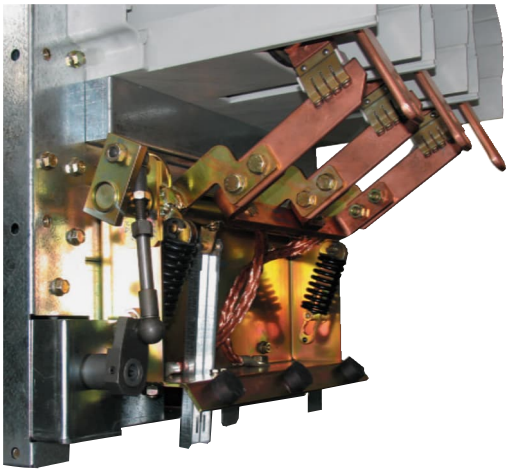
Tab. 3 – VT trucks for PB/M - PB/RM

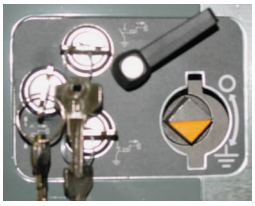
kV	Isc/ Icw (kA)	Dimensions	Cell type	PowerCube
12 17.5	16 20 25 31.5	W=750 mm (panel width) W=1000 mm (panel width) P=150 mm (pole distance VT)	Type F	PB2/M PB2/RM PB3/M PB3/RM
24	16 20 25 31.5	W=750 mm (panel width) W=1000 mm (panel width) P=200 mm (pole distance VT)	Type/W	PB4/M PB4/RM PB5/M PB5/RM

3. Main components

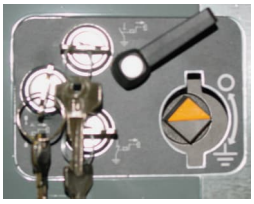
Earth switches

PowerCube units type PB can be equipped with an earthing switch. The earthing switch possesses short-circuit making capacity. On request, the opening and closing operations can be inhibited by means of key locks. The earthing switch is operated from the front of the module by means of a manual operation appropriately interlocked with the circuit-breaker's position.
Not available on PB/FL



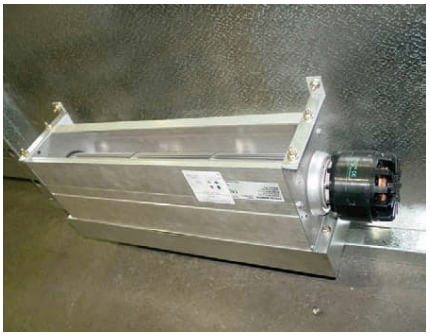


Earthing switch closed



Earthing switch open

Indication of the earthing switch (open/closed) visible from the front of the enclosure.



A fan for forced ventilation is pre-installed in PB3 units size 3600 A and PB5 units size 2500 A. To reach 4000A with PB3 a second fan (in the picture) shall be installed, according with ABB prescriptions, in the rear of the panel (at the customer's charge).

Monoblocks and shutters

The spout consist of an insulated monoblock containing the upper and lower power connections of the Circuit breaker or contactor compartment.

Branches for busbars connection are from upper monoblock while connections towards the cable compartment are from the lower one.

The metallic shutters are automatically actuated when the circuit-breaker moves from the test/isolated position to the connected position and vice versa.

They are always equipped with a fail-safe safety device to prevent them from being manually open by an operator when the apparatus compartment is empty. Shutters can be locked by means of padlocks. (optional).

Insulating monoblocks with contacts for rated current up to 2500 A.

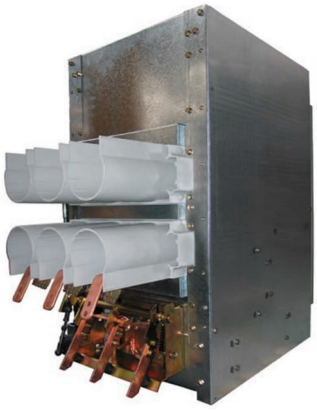
Insulating monoblocks with contacts for rated current of up to 4000 A.

Segregating shutters with metal partitions

Notes for use of PowerCube Units type PB

- **PowerCube Units type PB1 ... PB5** are recommended for incoming, outgoing and bus-tie panels.

Example of a PowerCube
Unit type PB1 ... PB5
(front and rear views)



- **PowerCube Units type PB1/R ... PB5/R** are recommended for riser, metering and direct busbar incoming panels.

Example of a PowerCube
Unit type PB1/R ... PB5/R
(front and rear views)

Tab. 4 - PowerCube units without apparatus (PB/RM, PB/RE)

Characteristics of the enclosure/module					
Rated voltage (kV)	Width (mm)	Rated current (A)	Isc (kA) (1)	Icw (kA x 3s/1s) (1)	PowerCube
12-17.5	600 (2)	1250	31.5	31.5	PB1/RE - PB1/RM
12-17.5	750	2000	31.5	31.5	PB2/RE - PB2/RM
12-17.5	750	2000	40-50	40-50	PB2/RE - PB2/RM
12-17.5	1000	4000	31.5	31.5	PB3/RE - PB3/RM
12-17.5	1000	4000	40-50	40-50	PB3/RE - PB3/RM
24	750	1250	31.5	31.5	PB4/RE - PB4/RM
24	1000	2500	31.5	31.5	PB5/RE - PB5/RM

(1) On earthing switch, if requested.
(2) VT Cell not available

3. Main components

Accessories

1a Signalling contacts for circuit-breaker/ contactor in connected/isolated position

Standard fitting is 10 contacts (5 normally open and 5 normally closed in change-over configuration) to signal connected position and another ten to signal the isolated position. A second group of 10 contacts is available on request for both signals. Not available on PB/F - PB/FL.

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

1b Anti-racking-in lock for circuit-breakers / contactors with a rated current lower than the cubicle or for apparatus not envisaged for the cubicle itself

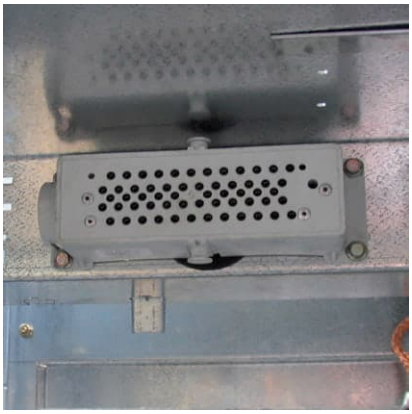
Consists of a code on the socket that prevents the plug from being inserted if the rated current of the apparatus is incompatible with the one of the PowerCube.

In order to work correctly, this lock requires a counterpart on the circuit-breaker or contactor, a combination of a coding on the apparatus plug and the locking magnet on the truck (-RL2).

The plug cannot be removed when the apparatus is in connected position or halfway between rack-in and isolated position.

Not available on PB/F - PB/FL.

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes



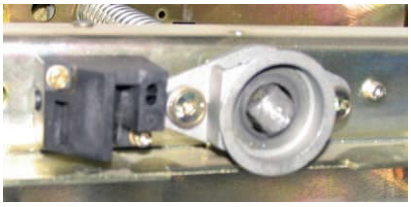
Specifications	Rated voltage	V	up to 250 a.c. (50–60 Hz)/d.c.
	Insulation voltage 50 Hz/1 min	V	2000 (towards earth)
	Rated current	A	5
	Rated thermal current	A	17.5
Breaking capacity of auxiliary contacts	48 V (d.c.)	A	3
	110 V (d.c.)	A	0.8
Resistive load	220 V (d.c.)	A	0.5
Inductive load: L/R = 5 ms	48 V (d.c.)	A	1.5
	110 V (d.c.)	A	0.5
	220 V (d.c.)	A	0.3

1c Lock to prevent rack-in with the door open

Prevents withdrawable apparatus from being moved from the test/isolated position to the connected position (and vice versa) with the door open. In order to function correctly, this lock requires a counterpart on the circuit-breaker. Not available on PB/F - PB/FL.

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

Lock installed in internal part of door



Counterpart on the apparatus

1d Safety device for shutters (fail-safe)

It is a mechanical device that is always supplied and that prevents manual open of a shutter by an operator when the apparatus compartment is empty

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F PB/FL	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

3. Main components

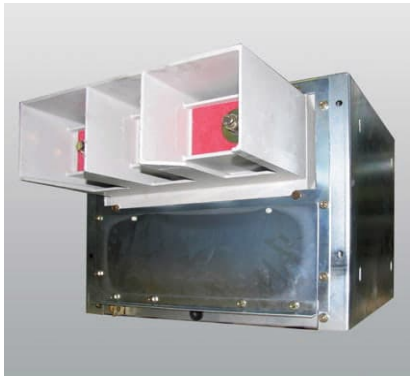
Accessories that must be obligatorily indicated when ordering

2 Withdrawable VT compartment (includes VT truck)

Can only be applied to module units (PB/M - PB/RM) for which the necessary presetting must be requested.

The VT compartment is equipped with 2 normally open and 2 normally closed auxiliary position contacts for the VT truck.

24kV cell



12÷17kV cell

3 Earthing switch ST/E with making capacity

Not available on PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	yes
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

4 Key locks on earthing switches

Two key locks are available on request for the earthing switch, 3 options are available:

a) Key lock with free key with earthing switch open.

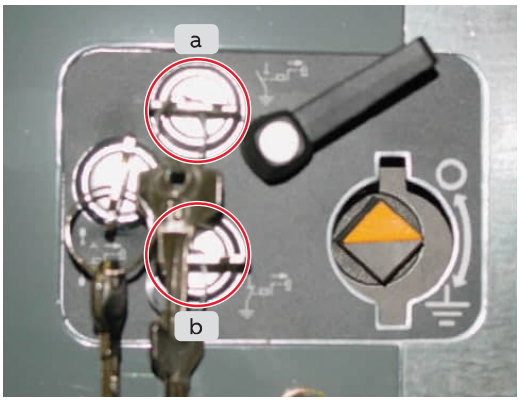
b) Key lock with free key with earthing switch closed.

c) Key lock with free key with earthing switch open and Key lock with free key with earthing switch closed.

The application is available also with a reinforced key .

Not available on PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes



5 Electromechanical lock on the earthing switch (BED)

Lock the earthing switch if auxiliary power is voluntarily cut or is missing:
de-energization electromechanical lock connected to the earthing switch actuator operating shaft.

Not available on PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

Rated voltage		
d.c.	V	24-30-48-60-110-125-220-250
a.c. 50 Hz	V	110-220
a.c. 60 Hz	A	110-220
Breaking capacity of auxiliary contacts		
d.c.	W	10.5 ± 1.5
a.c.	VA	20 ± 3

3. Main components

6 Auxiliary contacts for the earthing switch

Units equipped with earthing switches are available:

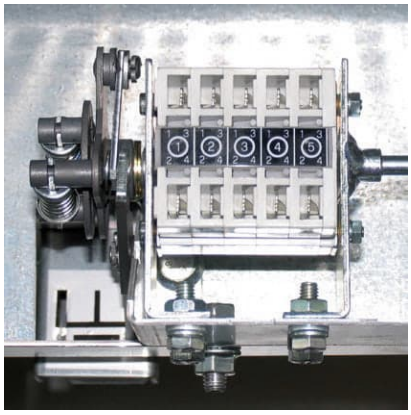
a) Pack of 5 auxiliary contacts

b) Pack of 10 auxiliary contacts.

The customer can easily change the settings of the auxiliary contacts from normally open to normally closed and vice versa.

Not available on PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	yes
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes



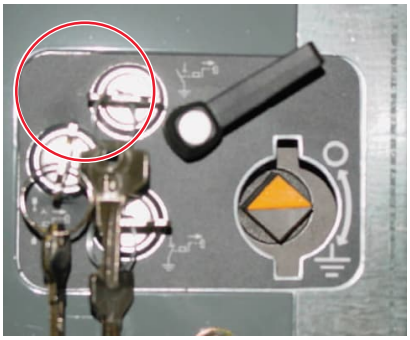
Specifications		Hz)/d.c.
Specifications	V	24-500 a.c. (50-60
Insulation voltage 50 Hz/1 min	V	2500
Rated thermal current	A	10
Breaking capacity of auxiliary contacts		
500 V (a.c. 50/60 Hz); cos=0.4	A	6
220 V (a.c. 50/60 Hz); cos=0.4	A	10
220 V (d.c.); L/R=10 ms	A	1
Number of operations	op/N°	8

7 Circuit-breaker anti-racking-in lock

(the apparatus cannot be switched from the isolated position to the racked-in position when the key has been removed).

Not available on PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes



8 Voltage signalling lamps (VDIS)

These lamps indicate presence of primary voltage. VDIS can be pre-assembled on request on PB/M modules with the appropriate presetting while for PB/E, PB/F and PB/FL units, they can be supplied loose and assembled by the customer in the low voltage compartment.
VPIS can receive the signal from post insulators with capacitive dividers, by combi-sensors or by current transformers.

9 Opening or closing operations with the door closed

This accessory is available on request for circuit-breakers and contactors; available options are as below.
VD4 and VD4-G circuit breakers:
- open push-button.
- open and close push-buttons.

VM1, VSC and mechanically latched ConVac:
- Slot to operate with emergency open rod (provided with the apparatus).

This accessory requires different and specific doors for the different type of apparatus.
This accessory is not available for PB/F and PB/FL units.
This accessory is not available for:
- 50 kA circuit breakers.
- PB/F and PB/FL units

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F PB/FL	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	yes
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/measure-ments	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	no
PB2/T	750	•	•			•	no
PB4/T	750			•		•	no

3. Main components

10 Position contacts for earthing truck

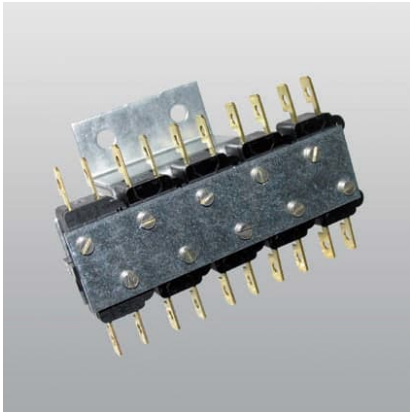
Signal when the earthing truck is in connected position. Two kits are available:

a) Group of 5 contacts

b) Group of 10 contacts

This accessory it is not available on PB/F and PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	no
PB2/T	750	•	•			•	no
PB4/T	750			•		•	no



Specifications		
Rated voltage	V	up to 250 a.c. (50-60 Hz)/d.c.
Insulation voltage 50 Hz/1 min	V	2000 (towards earth)
Rated current	A	5
Rated thermal current	A	17.5
Breaking capacity of auxiliary contacts		
Resistive load		
48 V (d.c.)	A	3
110 V (d.c.)	A	0.8
220 V (d.c.)	A	0.5
Inductive load: L/R = 5 ms		
48 V (d.c.)	A	1.5
110 V (d.c.)	A	0.5
220 V (d.c.)	A	0.3

11 Electromechanical door lock

The lock only allows the door to be opened if the locking device is energized.

This accessory it is not available on PB/F and PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

Rated voltage		
d.c.	V	24-30-48-60-110-125-220-250
a.c. 50 Hz	V	110-220
a.c. 60 Hz	A	110-220
Rated power		
d.c.	W	10.5 ± 1.5
a.c.	VA	20 ± 3
Operation		Unsuitable for continuous service (Energize to open door and normally leave de-energized)

12 Anti-condensation heaters

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F PB/FL	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	yes
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

Rated voltage		
a.c. 50 Hz	V	110-220
a.c. 60 Hz	A	110-220
Rated power		

13 Shutter padlocks

Can be fitted to the upper, lower shutters, or both.

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F PB/FL	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

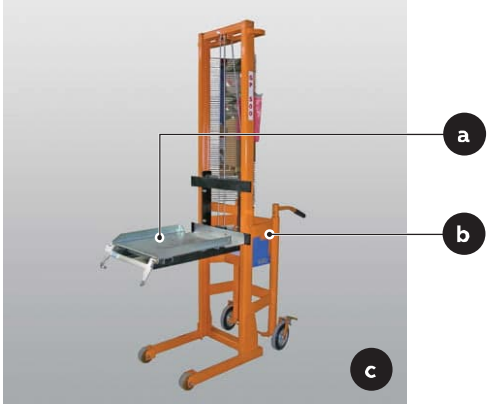
3. Main components

14 Earthing switch operating lever
Standard fitting if Earthing switch is required: 1 lever on each order confirmation or on each group of enclosures for each position of the order confirmation.
Extra levers are supplied on request as accessories.
Not available for PB/FL

16 Circuit-breaker lifting and transporting unit
Allows the withdrawable apparatus to be safely lifted to plug it into the PowerCube unit.
Available options are:
a) Plate for lifting trolley
b) Lifting trolley
c) Complete kit (plate installed on trolley).

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/measure-ments	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	yes
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F PB/FL	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes



3. Main components

15 Transport trolley

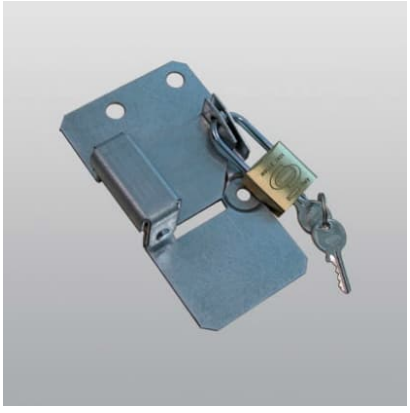
With fixed height proportional to the height of PB/M modules. Allows the apparatus to be plugged into the module.

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F PB/FL	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

17 Padlock on earth switch

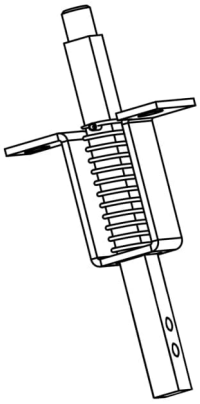
Prevents insertion of earthing switch operating lever by means of a padlocked device.
The device is to be assembled on the operating slot of the earthing switch actuator.

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/mea-surements	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	yes
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes



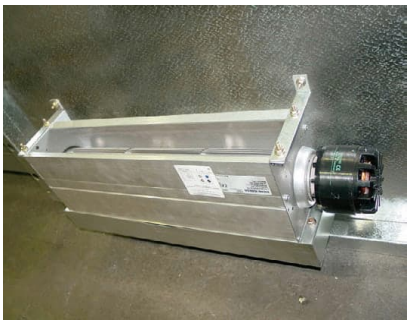
18 Mechanical lock for cable access compartment door.
Prevent opening of cable access compartment door with the earthing switch in open position. For PB/E and PB/F it is provided loose. It is responsibility of the customet to assemble it and check functionality of the lock with his door.
Not available on PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/measure-ments	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	yes
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes



19 Rear fan to install at rear of switchgear
When installed according to the instructions in the PowerCube manual, this fan can allows to reach 4000 A rated thermal current in panels based on a PowerCube PB3 3600 A.

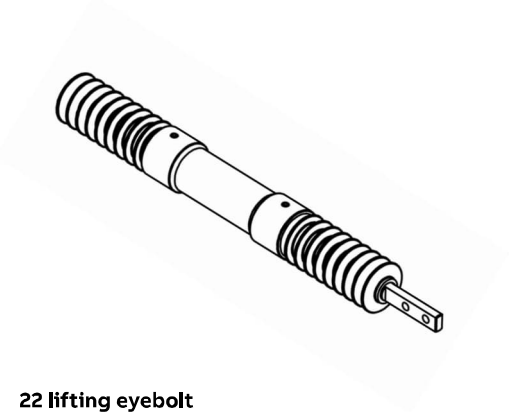
PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M PB/F PB/FL	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/measure-ments	
PB1	600	•	•		•		no
PB2	750	•	•		•		no
PB3	1000	•	•		•		yes
PB4	750			•	•		no
PB5	1000			•	•		no
PB1/R	600	•	•			•	no
PB2/R	750	•	•			•	no
PB3/R	1000	•	•			•	no
PB4/R	750			•		•	no
PB5/R	1000			•		•	no
PB1/T	600	•	•			•	no
PB2/T	750	•	•			•	no
PB4/T	750			•		•	no



20 Key locks for the earthing truck
It is used to inhibit the rack-in operation of the Earthing truck. Two locks are supplied:
One lock for earthing truck to earth busbars (truck with upper phases)
one lock earthing truck to earth cables (truck with lower phases).
Both key locks can be installed in the same enclosure. Not available for PB/F and PB/FL

PowerCube unit		Rated voltage			Type of Unit		Available accessory
PB/E PB/M	Width (mm)	12 kV	17.5 kV	24 kV	Bus tie/ incoming/ outgoing	Direct incoming/ riser/measure-ments	
PB1	600	•	•		•		yes
PB2	750	•	•		•		yes
PB3	1000	•	•		•		yes
PB4	750			•	•		yes
PB5	1000			•	•		yes
PB1/R	600	•	•			•	yes
PB2/R	750	•	•			•	yes
PB3/R	1000	•	•			•	yes
PB4/R	750			•		•	yes
PB5/R	1000			•		•	yes
PB1/T	600	•	•			•	yes
PB2/T	750	•	•			•	yes
PB4/T	750			•		•	yes

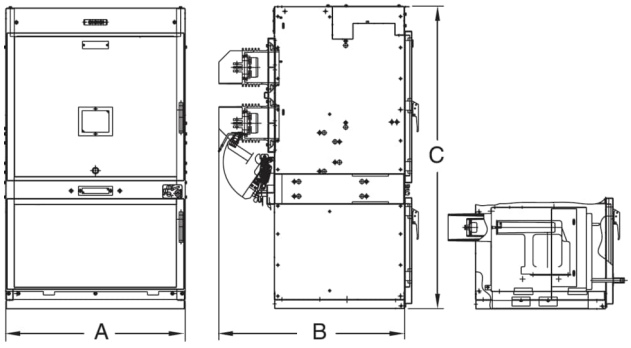
21 CT rods
Allow usage of CT rods for metering and protection. Installation, testing and functional verifications are at customer care



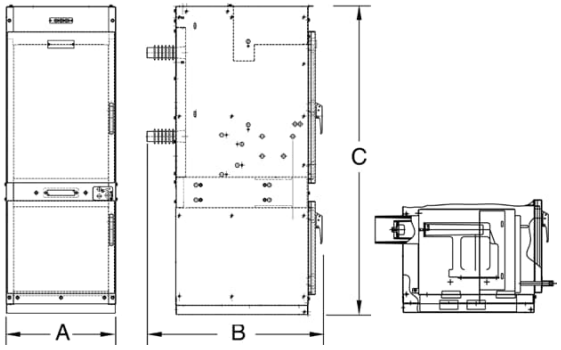
22 lifting eyebolt
Allow to lift with a crane PowerCube modules
It is available only for PB/M units

4. Overall dimensions and weights

Type PB/M units



Type PB/RM units

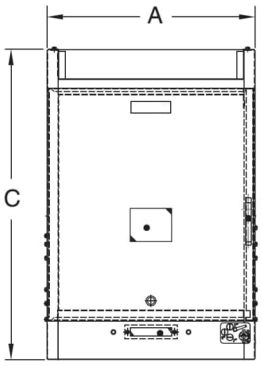


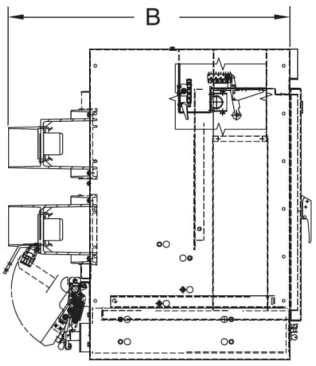
Module	Rated voltage [kV]	Rated current [A]	Isc Icw [kA]	Dimension table	A [mm]	B [mm]	C [mm]	Weight [kg] (1)
PB1/M	12	630 - 1250	31.5	1VCD000023	600	1016	1680	200
	17.5	630 - 1250	31.5	1VCD000028	600	1016	1680	200
PB2/M	12	630...2000	31.5	1VCD000024	750	1016	1680	200...260
	12	1250...2000	40-50	1VCD000027	750	1016	1680	200...260
	17.5	630...2000	31.5	1VCD000029	750	1016	1680	200...260
	17.5	1250...2000	40-50	1VCD000030	750	1016	1680	200...260
PB3/M	12-17.5	2500	31.5	1VCD000025	1000	1030	1680	320
	12-17.5	3150	31.5	1VCD000026	1000	1030	1680	344
	12-17.5	3600...4000	31.5	1VCD000043	1000	1030	1680	370...400
	12-17.5	2500	40-50	1VCD000037	1000	1030	1680	320
	12-17.5	3150	40-50	1VCD000038	1000	1030	1680	344
	12-17.5	3600 - 4000	40-50	1VCD000039	1000	1030	1680	370...400
PB4/M	24	630 - 1250	31.5	1VCD000031	750	1246	1745	270
PB5/M	24	1600 - 2000	31.5	1VCD000032	1000	1246	1745	330
	24	2500	31.5	1VCD000044	1000	1246	1745	360

Module	Rated voltage [kV]	Rated current [A]	Isc Icw [kA]	Dimension table	A [mm]	B [mm]	C [mm]	Weight [kg] (1)
PB1/RM	17.5	not applicable	31.5	1VCD000033	600	1016	1745	185
PB2/RM	12		31.5	1VCD000034	750	1016	1745	185...235
	17.5		40-50	1VCD000040	750	1016	1745	185...235
PB3/RM	12-17.5		31.5	1VCD000041	1000	1030	1680	290
	12-17.5		40-50	1VCD000042	1000	1030	1680	290
PB4/RM	24		31.5	1VCD000035	750	1246	1745	270
PB5/RM	24		31.5	1VCD000036	1000	1246	1745	270
PB1/TM	12-17.5	not applicable	31.5	1VCD003639	600	1016	1745	185
PB2/TM	12-17.5		40-50	1VCD003640	750	1016	1745	185...235
PB3/TM	24		31.5	1VCD003641	1000	1016	1745	270

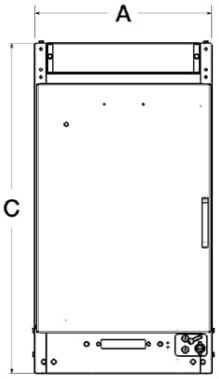
(1) Weight without earth switch and without TV compartment.
(2) Dimension with earth switch applied.

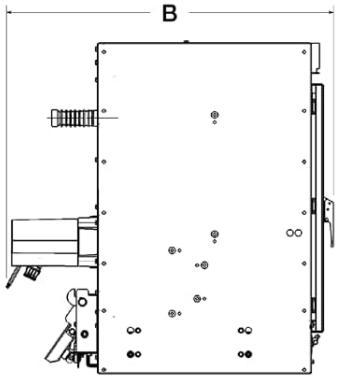
Type PB/E units





Type PB/RE units



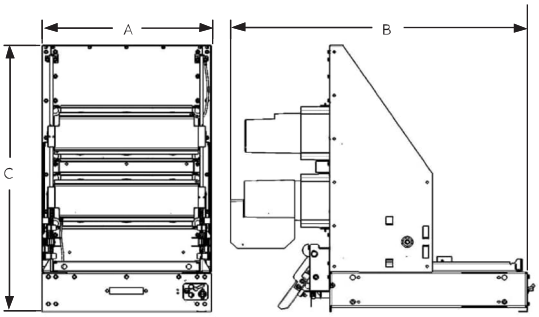


Module	Rated voltage [kV]	Rated current [A]	Isc Icw [kA]	Dimension table	A [mm]	B [mm]	C [mm]	Weight [kg] (1)
PB1/E	12	630 - 1250	31.5	1VCD003369	600	1016	1120	180
	17.5	630 - 1250	31.5	1VCD003369	600	1016	1120	180
PB2/E	12	630...2000	31.5	1VCD003370	750	1016	1120	200...240
	12	1250...2000	40-50	1VCD003370	750	1016	1120	200...240
	17.5	630...2000	31.5	1VCD003370	750	1016	1120	200...240
	17.5	1250...2000	40-50	1VCD003370	750	1016	1120	200...240
PB3/E	12-17.5	2500	31.5	1VCD003371	1000	1030	1120	300
	12-17.5	3150	31.5	1VCD003372	1000	1030	1120	320
	12-17.5	3600...4000	31.5	1VCD003373	1000	1030	1120	350...380
	12-17.5	2500	40-50	1VCD003371	1000	1030	1120	300
	12-17.5	3150	40-50	1VCD003372	1000	1030	1120	320
	12-17.5	3600 - 4000	40-50	1VCD003373	1000	1030	1120	350...380
PB4/E	24	630 - 1250	31.5	1VCD003374	750	1246	1230	250
PB5/E	24	1600 - 2000	31.5	1VCD003375	1000	1246	1230	310
	24	2500	31.5	1VCD003376	1000	1246	1230	340
PB1/RE	17.5	not applicable	31.5	1VCD003377	600	1016(2)	1120	165
PB2/RE	17.5		31.5	1VCD003378	750	1016(2)	1120	165...215
	17.5		40-50	1VCD003378	750	1016(2)	1120	165...215
PB3/RE	12-17.5		31.5	1VCD003379	1000	1030(2)	1120	270
	12-17.5		40-50	1VCD003379	1000	1030(2)	1120	270
PB4/RE	24		31.5	1VCD003380	750	1246(2)	1230	215
PB5/RE	24		31.5	1VCD003381	1000	1246(2)	1230	250
PB1/TE	12-17.5	not applicable	31.5	1VCD003636	600	1016	1120	165
PB1/TE	12-17.5		40-50	1VCD003637	750	1016	1120	200
PB1/TE	24		31.5	1VCD003638	750	1246	1230	220

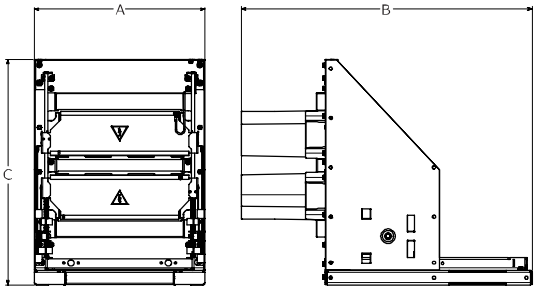
(1) Weight without earth switch.
(2) Dimension with earth switch applied.

4. Overall dimensions and weights

Type PB/F units



Type PB/FL units

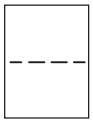


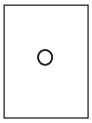
Module	Rated voltage [kV]	Rated current [A]	Isc Icw [kA]	Dimension table	A [mm]	B [mm]	C [mm]	Weight [kg] (1)
PB1/F	12÷17.5	630 ÷1250	31.5	1VCD003382	596	1016	900	(*)
PB2/F	12	630÷2000	31.5	1VCD003383	746	1016	1096	(*)
	12	1250÷2000	40÷50	1VCD003383	746	1016	1096	(*)
	17.5	630÷2000	31.5	1VCD003383	746	1016	1096	(*)
	17.5	1250÷2000	40-50	1VCD003383	746	1016	1096	(*)
PB3/F	12÷17.5	2500	31.5	1VCD003893	996	1030	1096	(*)
	12÷17.5	2500	40÷50	1VCD003893	996	1030	1096	(*)
	12÷17.5	3150	31.5	1VCD003914	996	1030	1096	(*)
	12÷17.5	3150	40÷50	1VCD003914	996	1030	1096	(*)
	12÷17.5	3600÷4000	31.5	1VCD003928	996	1030	1096	(*)
	12÷17.5	3600÷4000	40÷50	1VCD003928	996	1030	1096	(*)
PB4/F	24	630 ÷1250	31.5	1VCD003384	746	1338	1236	(*)
PB1/FL	12÷17.5	630 ÷1250	31.5	1VCD003614	596	1015	787	(*)
PB2/FL	12÷17.5	630÷2000	31.5	1VCD000210	746	1015	983	(*)
	12÷17.5	1250÷2000	40÷50	1VCD000210	746	1015	983	(*)
PB1/TF	12÷17.5	not applicable	31.5	1VCD003642	596	1016	900	(*)
PB2/TF	12÷17.5		31.5	1VCD003643	746	1016	1096	(*)
PB4/TF	24		31.5	1VCD003644	746	1334	1226	(*)

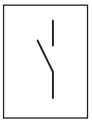
(*) Ask ABB.

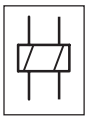
5. Wiring diagrams

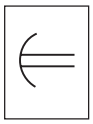
Symbols (in compliance with Standards IEC 60617 and CEI EN 60617)

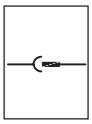

Mechanical, pneumatic or hydraulic connection

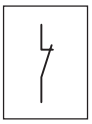

Terminal

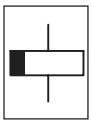

Make contact

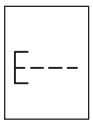

Control coil with two separate windings


Delayed movement (in the movement of the arc towards its center)

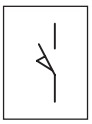

Socket and plug (female and male)

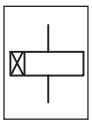

Break contact

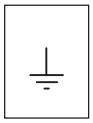

Control coil of a slow-releasing relay

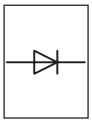

Pushbutton actuaor


Capacitor (general symbol)

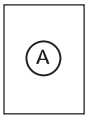

Make position contact (limit)


Control coil of a slow-operating relay

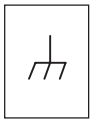

Earth, (general symbol)

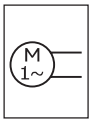

Semiconductor diode (general symbol)


Break position contact (limit)



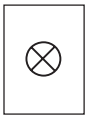
Ammeter

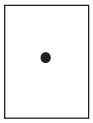

Earth, frame

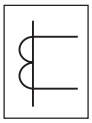


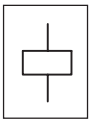
Single-phase asynchro-nous otor, short-circuited rotor, terminals for aux. phase routed outside


Position change-over break before make contact (limit)


Lamp (general symbol)


Conductor connections

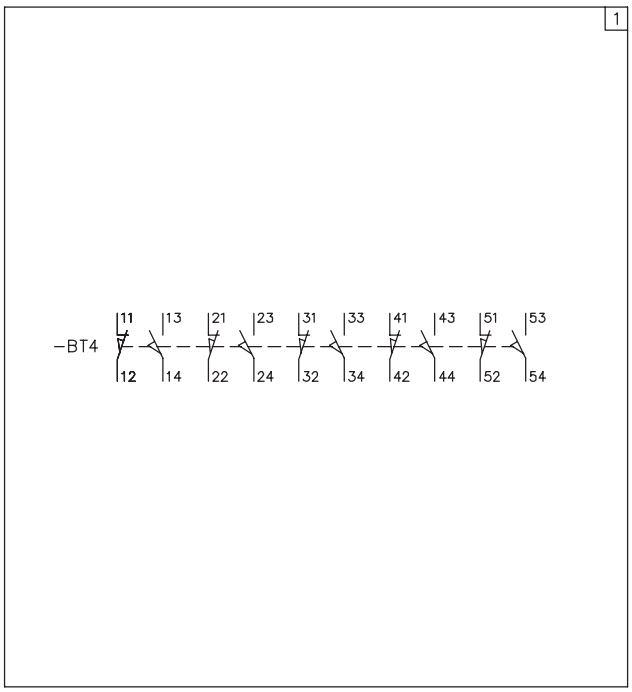

Current transformer


Control coil (general symbol)

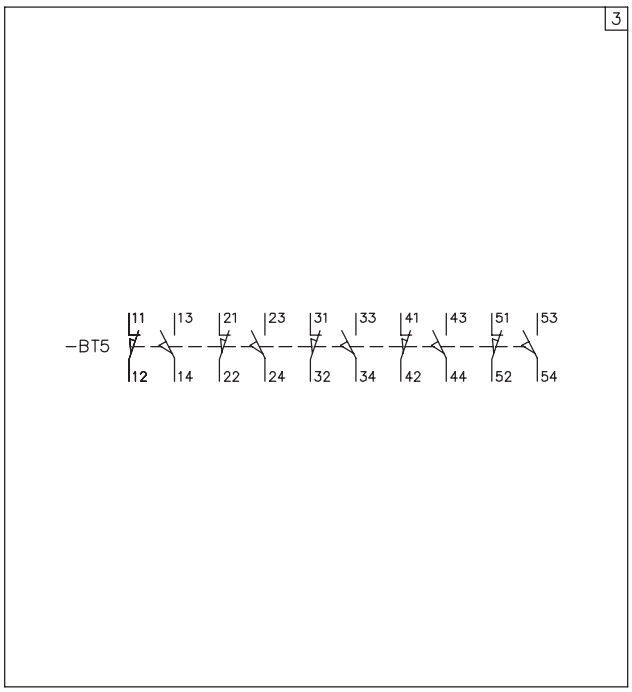
5. Wiring diagrams

Application diagrams

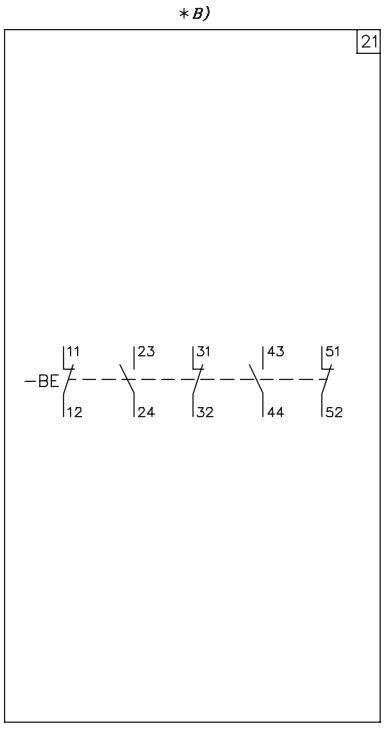
*C)



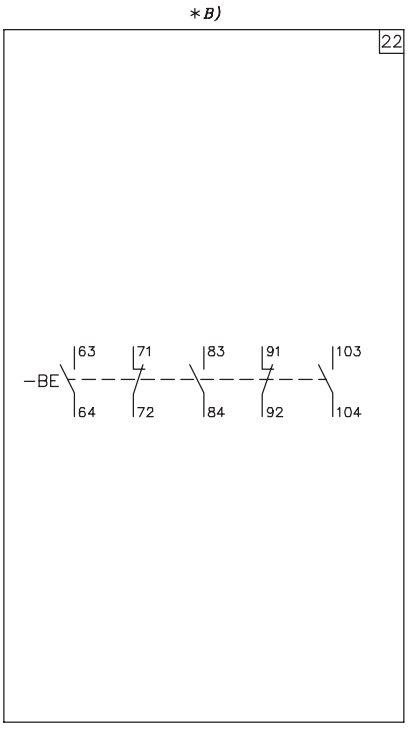
*C) D)

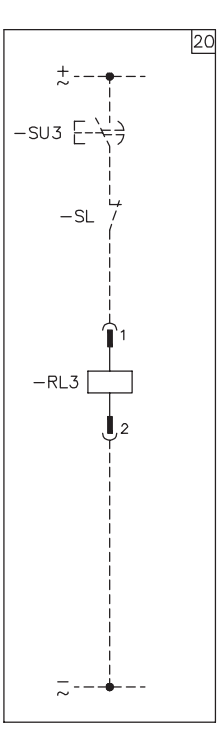


*B)

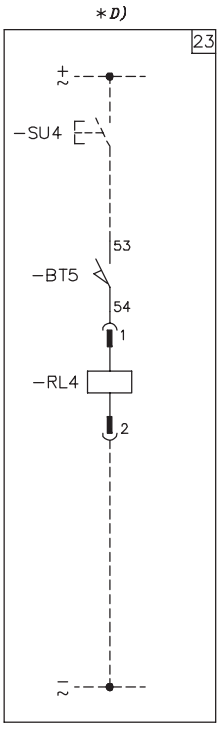


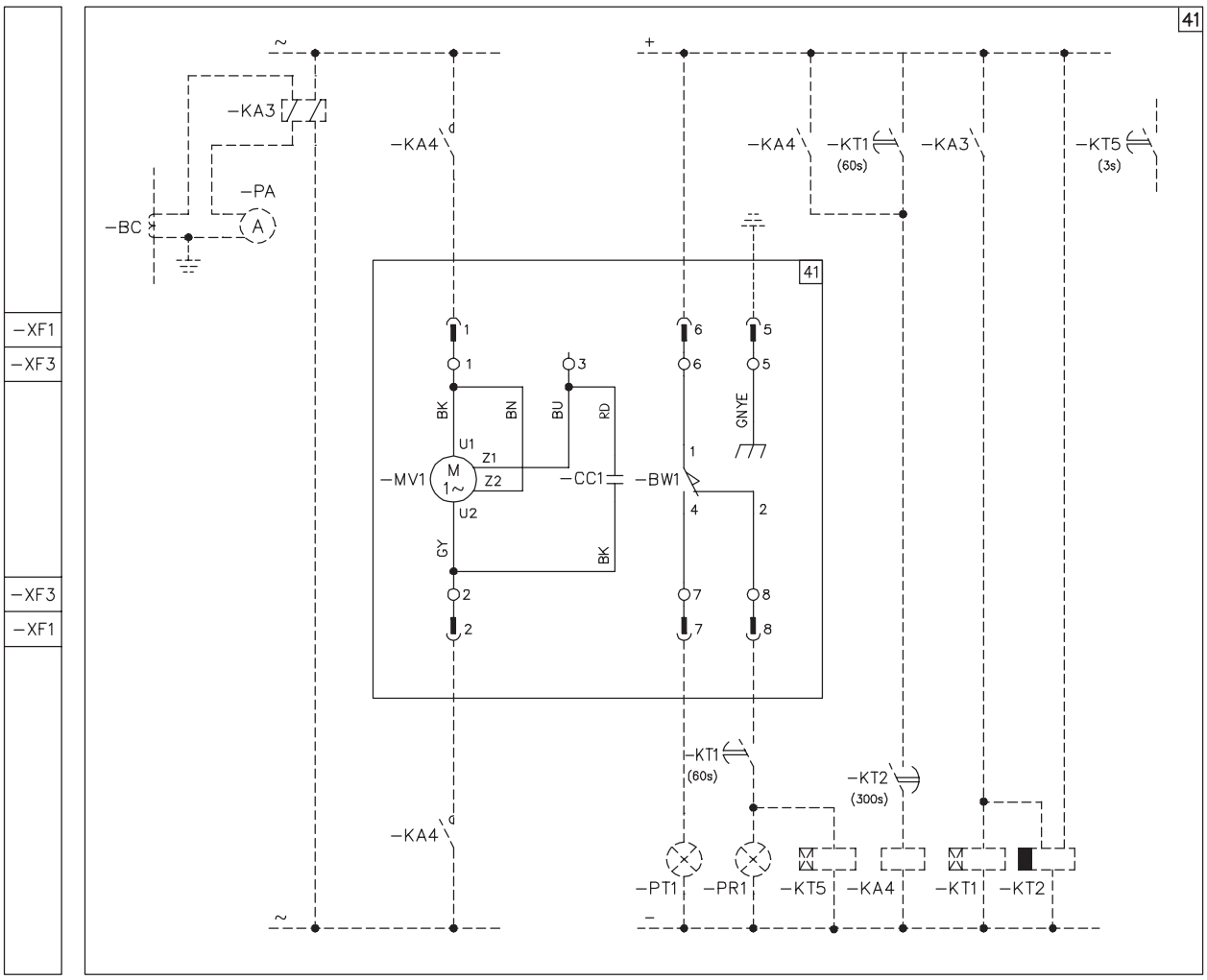
*B)



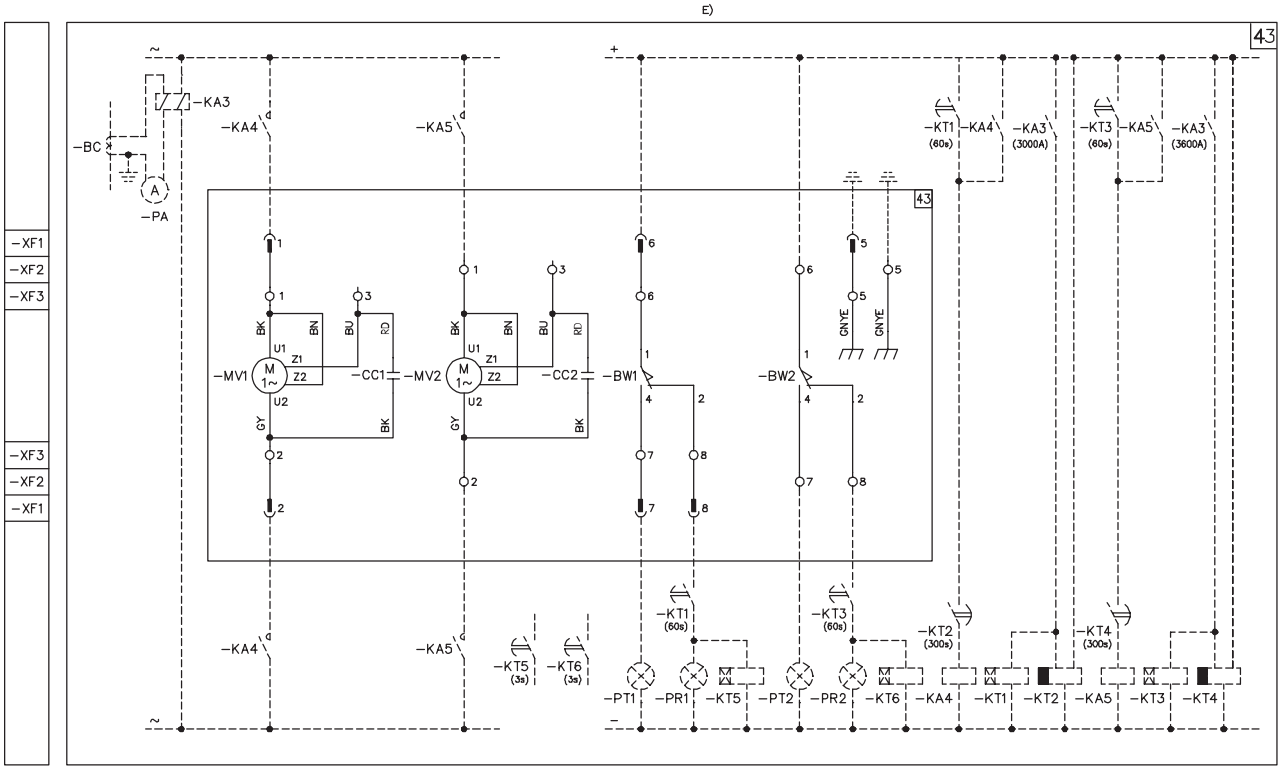


*D)




41
~
+
−KA3
−KA4
−KA4
−KT1
(60s)
−KA3
−KT5
(3s)
−PA
−BC
A
41
−XF1
−XF3
−XF3
−XF1
1
1
3
6
6
5
5
BK
BN
BU
RD
GNYE
U1
Z1
M
1~
Z2
U2
−MV1
−CC1
−BW1
1
4
2
GY
BK
2
2
7
7
8
8
−KT1
(60s)
−KT2
(300s)
−KA4
−PT1
−PR1
−KT5
−KA4
−KT1
−KT2
~
−

5. Wiring diagrams



Reference designations

(in compliance with standard IEC 61346-2 and technical standard ABB 2NBA000001).

Description	Figure number of the diagram
-BC	Current transformer
-BE	Auxiliary contacts of the earth switch (see note B)
-BT4	Contacts on switchgear for signalling trolley in racked-in position (see note C)
-BT5	Contacts on switchgear for signalling trolley in isolated position (see note C)
-BW1	Front fan position contact
-BW2	Rear fan position contact
-CC1	Capacitor for front fan
-CC2	Capacitor for rear fan
-KA3	Current metering relay
-KA4	Auxiliary contact for front fan operation
-KA5	Auxiliary contact for rear fan operation
-KT1, -KT2	Timed auxiliary relays for forced front fan operation
-KT3, -KT4	Timed auxiliary relays for forced rear fan operation
-KT5	Timed auxiliary relay for forced front ventilation failure alarm signal
-KT6	Timed auxiliary relay for forced rear ventilation failure alarm signal
-MV1	Front fan (see note E)
-MV2	Rear fan (see note E)
-PA	Ammeter
-PR1	Red lamp for forced front ventilation failure alarm signal
-PR2	Red lamp for forced rear ventilation failure alarm signal
-PT1	White lamp for forced front ventilation operation alarm signal
-PT2	White lamp for forced rear ventilation operation alarm signal
-RL3	Electromechanical lock on earth switch closing operation
-RL4	Locking magnet. Mechanically inhibits door opening if de-energized
-SL	Contact for locking earth switch operation
-SU3	Delay button for enabling earth switch operation (maximum permissible delay 1 minute)
-SU3	Door release button
-XF1	Connector for disconnecting the forced front ventilation circuits
-XF2	Connector for the forced rear ventilation circuits
-XF3	Connector for the forced front ventilation circuits

Figure	Description
Fig. 1	Electrical signalling contacts for switch in plugged-in position (see note C)
Fig. 3	Electrical signalling contacts for switch in isolated position (see note C)
Fig. 20	Circuit of electromechanical lock on earth switch closing operation: the operation is only permitted with coil -RL3 energized
Fig. 21	First pack of auxiliary contacts of the earth switch (see note B)
Fig. 22	Second pack of auxiliary contacts of the earth switch (see note B)
Fig. 23	Circuit of electromechanical door opening lock: opening is only permitted with coil -RL3 energized
Fig. 41	Forced front ventilation circuit
Fig. 43	Forced front and rear ventilation circuit

Notes

A) The switchgear comes solely equipped with the specific applications in the order confirmation

B) The auxiliary contacts -BE are supplied in the position indicated in the diagram. However, the user can easily convert them from make contacts to break contacts or vice versa.

C) Position contacts -BT4 and BT5 are switch contacts. This means that the make contact and the break contact belonging to the same position contact cannot be powered with different voltage values.

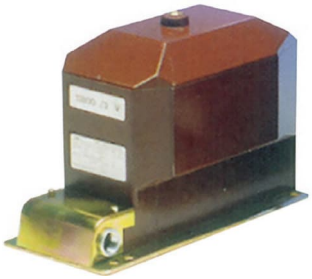
D) When fig. 23 is required, the contact -BT5 (terminals 51-52-53-54) of fig. 3 is not available
Symbols (in compliance with Standards IEC 60617 and CEI EN 60617)

E) The fans must activate when at least one phase exceeds the following thresholds for 60 seconds:
- UniSafe 12-17.5 kV 3600 A = 3000 A (front fan)
- UniSafe 12-17.5 kV 4000 A = 3000 A (front fan) and 3600 A (rear fan)
- UniSafe 24 kV 2500 A = 2250 A (front fan).

The fans must disconnect when the current of all three phases is lower than the following values for 300 seconds:
- UniSafe 12-17.5 kV 3600 A = 2900 A (front fan)
- UniSafe 12-17.5 kV 4000 A = 2900 A (front fan) and 3500 A (rear fan)
- UniSafe 24 kV 2500 A = 2150 A (front fan).

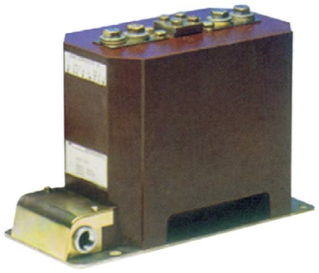
6. Switchgear completion

Voltage transformers



The voltage transformers are insulated in resin and are used for powering measuring devices and protections. They are available for fixed assembly or for istallation on withdrawable trolleys.
They conform to standard IEC 60044-2.
The dimensions normally comply with Standard DIN 42600,
while the transformers designed for installation on withdrawable trolleys are the dedicated type.
These transformers can have one or two poles and possess performance and accuracy classes that suit the functional requirements of the instruments to which they are connected.
When they are installed on withdrawable trolleys, they are equipped with medium voltage protection fuses. The fuses can be replaced whilst the switchgear is in service.

Current transformers



The current transformers are insulated in resin and are used for powering measuring devices and protections. These transformers can have a wound core or bushing bar with one or more cores and come with performance and accuracy classes that suit the requirements of the installation.
They conform to standard IEC 60044-1.
The dimensions normally comply with standard DIN 42600.
The current transformers can also be supplied with a capacitive socket for connection to voltage signalling lamps.

Measuring sensors (for applications with microprocessor protection units)

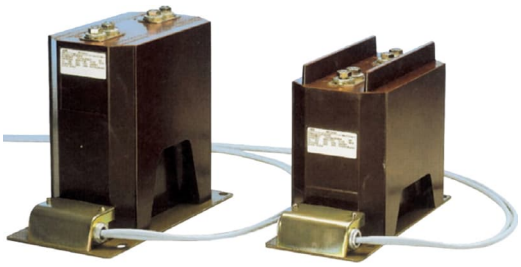


ABB KEDCD voltage-current combi-sensors

Use of digital technologies for electrical protection and measuring instruments has deeply modified the performance that transformers must provide.
The analog input levels of the instruments have become significantly lower than those of conventional systems.
This is why ABB has introduced a new range of sensors that meets the specifications of the new generation instruments in an optimal way.
The switchgear can be equipped with up to 24 kV ABB KEVCD Block Type sensors.
The current sensors comply with standards IEC 60044-8 (CDV), while the voltage sensors comply with standard IEC 60044-7.
The dimensions normally comply with standard DIN 42600 Narrow Type.
The resin casing can house current sensors and voltage sensors at the same time, or just the current sensor. A capacitive divider is also installed for connection to the voltage signalling lamps.
ABB multifunction units and measuring sensors comply with accuracy class CI.1.

6. Switchgear completion

Current sensor

The current sensor consists of a Rogowski coil without ferromagnetic core, thus unaffected by saturation phenomena. If a core is formed by a uniform winding over a non-magnetic closed core with a constant section, the voltage indiced in the secondary circuit will be directly proportional to the variations in the let-through current. This voltage must be integrated in order to obtain a signal proportional to the current provided. The multifunction devices accomplish this function and use the signal obtained for both the measurements and protections.

Main features of the current sensors

- Linear response over the entire measuring range;
- no saturation;
- no hysteresis;
- one single instrument for both protections and measurements;
- high accuracy class;
- high degree of immunity to electromagnetic disturbances;
- the output signal is a voltage (150 mV) proportional to the current variation over time. The current measurement is obtained by integrating the signal;
- two single coils cover the range from 0 to 3200 rated A;
- the winding can remain open even when the switchgear is under service conditions.

Scan o Tap on QR code to visit ABB instrument transformers and sensors website

Voltage sensor

The voltage sensor consists of a resistive divider through which the signal is taken. This sensor is also the non-saturable type and gives a linear response for the entire measuring range.
The output signal is a voltage directly proportional to the primary voltage. The resistive element consists of a bar of ceramic material. Voltage sensors are used at the same time to make measurements and energize the protections.

Main features of the voltage sensors

- Linear response over the entire measuring range;
- no saturation;
- no ferroresonance;
- one single instrument for both protections and measurements;
- high accuracy class;
- high degree of immunity to electromagnetic disturbances;
- the output signal is a voltage directly proportional to the primary voltage;
- the division ratio is 10000/1;
- one single divider covers the range from 0 to 24 rated kV.

6. Switchgear completion

REF 601 switchgear protection device

ABB can also supply the following components to complete the switchgear.
Please consult ABB for further details.

Relay REF 601 is a device that protects against overcurrents, with tripping curves in compliance with standard IEC 255-3. It protects against overload (51), instantaneous and delayed short-circuits (50-51), instantaneous and delayed homopolar earth faults (50N and 51N). It also detects the magnetizing current of a threephase transformer to prevent it from tripping in an untimely way when a transformer switches in (68). elay REF 601 must be energized in order to function.
The REF 601 relay can operate with up to 3 inputs from current sensors of the Rogowsky coil type and an input from an external toroidal current transformer. 4 rated current values can be entered via the keyboard: 40, 80, 250, 1250 A.
If the circuit-breaker is equipped with 3 current sensors, the 50N and 51N protection functions are accomplished with the vector sum of the phase currents. On the other hand, the external toroidal current transformer must be installed for the 50N and 51N functions if 2 current sensors are used. The external toroidal transformer can have either an openable or closed core and any transformer ratio, so long as there is 1 A secondary current.

Specific features of the REF 601 relay:
- Accurate interventions
- Wide setting ranges
- Single and contemporaneous adjustment of the three phases
- No limitation (due to the current sensors) to the rated breaking capacity or to the short-time withstand current of the circuit-breaker
- Local electric operating buttons
- 5 separate indicators: “relay operating”, “relay at tripping threshold”, “relay tripped”, “relay tripped due to phase over-current”, “relay tripped due to earth fault over-current”
- Interface consisting of an LCD display and by “arrow”, “enter” and “esc” keys for user-friendly browsing among the “measuring”, “data recording”, “event recording”, “settings”, “configuration” and “test” menus
- Three user levels: “Operator” (display only, free access), “configurator” (same as the previous level, but with the ability to enter the protection parameters and, if applicable, the communication parameters - access limited by a password), “administrator” (same as the previous level but with the ability to enter the passwords and configure the settings according to the device - access limited by a password)
- Continuous display of the current in the most loaded phase and the earth current
- Recording of the values of the currents that caused the device to trip
- Storage of the number of openings caused by the device
- Event recording (storage of the previously described parameters in the last 5 tripping actions of the device) in a non-volatile memory
- On request, version with RS485 serial link, 4 wires - MODBUS RTU full duplex protocol
- 24...240 V AC/DC multi-voltage feeder.

Relay REF 601 is also available in a specific version, in accordance with standard CEI 0-16 (for the Italian market), with reference to the point where MV energy is delivered to the distribution user.

Relion® protection and control relays

The Relion® product family offers the widest range of products for the protection, control, measurement and supervision of power systems for IEC and ANSI applications – from generation and interconnected transmission grids over primary distribution to secondary distribution kiosks.

The Relion® protection relays are deeply rooted in ABB's vast experience of developing successful protection and control relays. These relays have been developed during many years and are built on the experience gathered from wide ranging application and functionality requirements of ABB's customers globally.
To ensure interoperable and future-proof solutions, Relion® products have been designed to implement the core values of the IEC 61850 standard.

The genuine implementation of the IEC 61850 substation modelling and communication standard covers both vertical and horizontal information exchange between protection relays and external systems.
The protection and control IED manager PCM600 provides versatile functionality throughout the life cycle of all Relion® protection and control relays. PCM600 is IEC 61850 compliant, which ensures smooth engineering of the relays and enables information exchange with other IEC 61850 compliant tools.
With these products, you benefit from ABB's leading-edge technology, global application knowledge and experienced support network.
The Relion technology is leading the way and setting the future trends in the field of protection and control systems.

Relion protection and control product family

Scan o Tap on QR code to visit ABB protection relay website

6. Switchgear completion

Fuses

ABB CMF and CEF fuses can be supplied for use with the contactor, to protect lines, motors, capacitors, voltage transformers, etc.
The fuses shall be DIN standard.

Scan o Tap on QR code
to visit ABB fuses website

Surge arresters

MWD
Over-voltage protective device:
- Transformers
- Motors
- Cables
- Cable sheath.

Medium voltage switchgear:
- Alternating current applications (AC)
- For indoor use.

Technical specifications
Surge arrester against over-voltage with metal oxide resistor without stark-gap (MO surge arresters), enclosure in moulded silicone rubber, grey colour, designed and tested in accordance with standard IEC 60099-4.

More product information:
abb.com/mediumvoltage
Your contact center:
abb.com/contactcenters
More service information:
abb.com/service

1VCP000091 – Rev. I, en – Technical catalogue – 2024.11

DISTRIBUTION SOLUTIONS

VD4G

Medium voltage vacuum circuit breakers
15 kV - 1250...3150 A - 25...63 kA

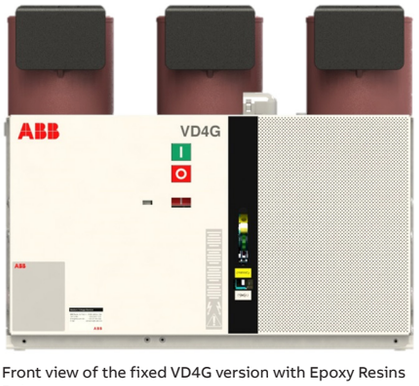
—

Vacuum circuit breakers for generator switching applications tested to meet the most stringent IEEE and IEC requirements for generator applications as per IEEE C37.013 and the new revision IEC/IEEE 62271-37-013, the only standards for GCB.

Index

1. ABB strenghts, your benefits

View of the withdrawable VD4G version with Thermoplastic Poles

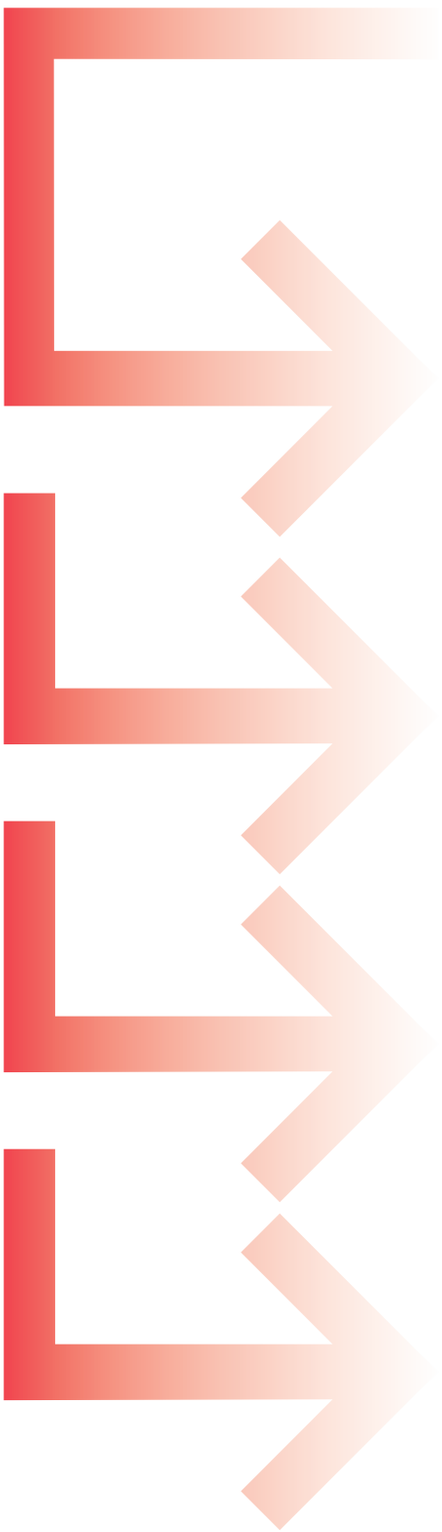


Front view of the fixed VD4G version with Epoxy Resins Poles

Back view of the withdrawable VD4G version with Thermoplastic Poles

VD4G: small footprint, full protection for generator applications

Thanks to the VD4G family you can:



Suit installations in standard medium voltage switchgear at the most cost effective solutions thanks to the VD4 compact design

Count on the highest Generator-fed fault breaking capacity at the same System-fed fault breaking capacity level among competitors

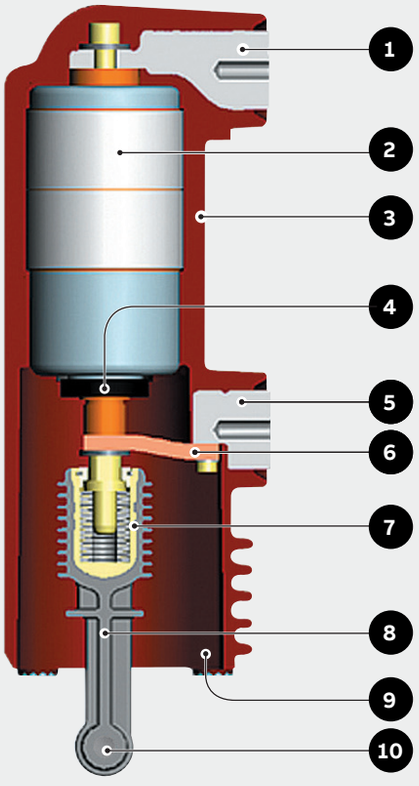
Experience the same familiar ABB medium voltage circuit breakers design

Take advantage from cassettes and module systems available for OEMs and panel builders to create their own solutions

2. Description

The new VD4G family epitomizes ABB's renowned technology and excellence in designing and constructing vacuum interrupters embedded in poles and circuit breakers.
VD4 medium voltage (MV) circuit breakers use vacuum interrupters embedded in the poles. This construction technique makes the circuit breaker poles particularly sturdy and protects the interrupter from impact, dust and humidity. The vacuum interrupter houses the contacts and forms the interrupting chamber.

Vacuum interruption technique
The vacuum circuit breaker does not need a breaking and insulating medium. Thus, the interrupter does not contain ionizable material. The electric arc that generates when the contacts separate is merely formed by the fusion and vaporization of the contact material.
Sustained by the external energy, the electric arc persists until the current is annulled near the natural zero crossing. In that instant, the dielectric properties are very rapidly restored by a sharp reduction in the density of the conveyed charge and rapid condensation of the metallic vapor.



1 Upper terminal
2 Vacuum interrupter
3 Housing/pole
4 Stem of moving contact
5 Lower terminal
6 Flexible connection
7 Tie-rod spring fork
8 Tie-rod
9 Pole fastening
10 Connection to operating mechanism

Vacuum interrupter embedded in the pole

- Vacuum interruption technique
- Vacuum contacts protected against oxidation and contamination
- Vacuum interrupter embedded in the pole
- Interrupter protected against shocks, dust and humidity
- Operation under different climatic conditions
- Limited switching energy
- Stored energy operating mechanism with anti-pumping device supplied as standard equipment
- Simple customization with a complete range of accessories
- Fixed and withdrawable versions
- Compact dimensions
- Sealed-for-life poles
- Sturdy and reliable
- Limited maintenance
- Circuit breaker racked in and out with the door closed
- Incorrect and hazardous operations prevented thanks to special locks in the operating mechanism and truck
- High degree of environmental compatibility

Thus the vacuum interrupter restores the insulating capacity and the ability to sustain the transient recovery voltage, thereby definitively extinguishing the arc.
Since high dielectric strength can be reached in the vacuum even with minimum distances, circuit breaking is also guaranteed when the contacts separate a few milliseconds before natural zero crossing.
The special shape of the contacts and material used, combined with the brief arcing time and low arc voltage guarantee long-lasting contacts with a minimum amount of wear. The vacuum also prevents the contacts from tarnishing and becoming contaminated.

Operating mechanism
Along with short travel and low weight, the low speed of the contacts limits the energy required for operation, thus guaranteeing extremely limited wear in the system.
This ensures that the circuit breaker also requires very little maintenance.

VD4G circuit breakers use a mechanical operating mechanism, with stored energy and free trip. These characteristics allow opening and closing operations to be performed independent of the operator. The simply designed, user-friendly operating mechanism can be customized with a wide range of easily and rapidly installed accessories. Since it is so simple, the apparatus is more reliable.

Structure
The operating mechanism and poles are fixed to a metal frame, which also acts as the support for the fixed version of the circuit breaker. The compact structure is sturdy and ensures mechanical reliability.
Apart from the isolating contacts and cord with plug for connecting the auxiliary circuits, the withdrawable version has a truck for racking it into and out of the switchgear or enclosure with the door closed.

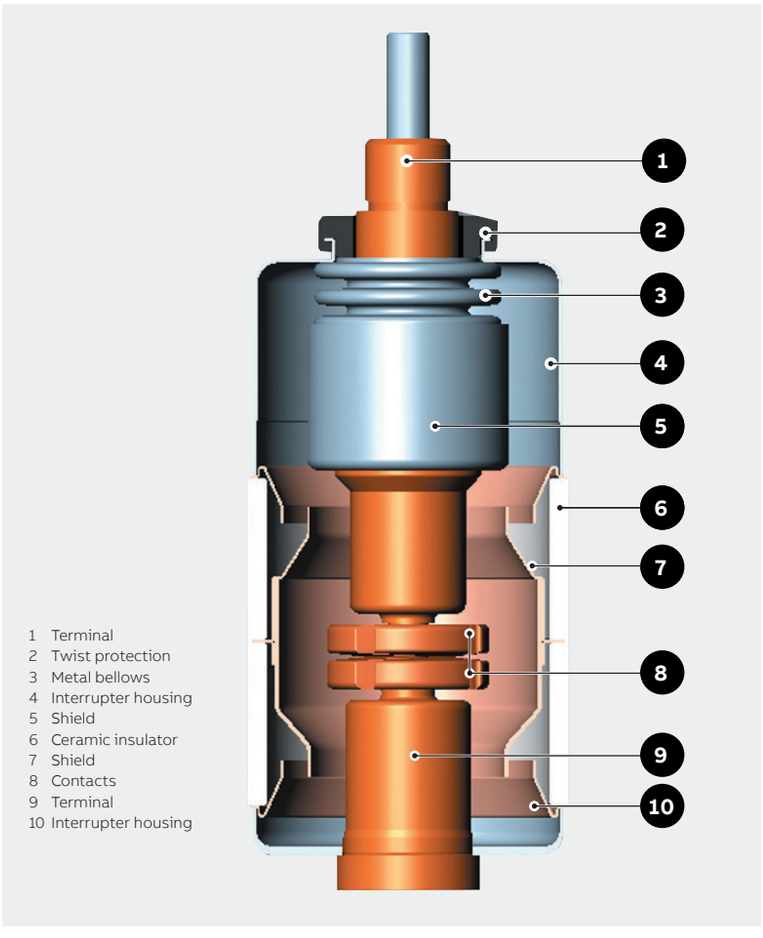
View of the withdrawable VD4G version with Thermoplastic Poles

Back view of the fixed VD4G version with Thermoplastic Poles

View of the withdrawable VD4G version with Epoxy Resins Poles

2. Description

Interruption principle of ABB interrupters



1 Terminal
2 Twist protection
3 Metal bellows
4 Interrupter housing
5 Shield
6 Ceramic insulator
7 Shield
8 Contacts
9 Terminal
10 Interrupter housing

Vacuum interrupter

In a vacuum interrupter, an electric arc begins the instant in which the contacts separate. It persists until zero crossing is reached and can be influenced by magnetic fields.

Diffuse or contracted arc in a vacuum
Individual points of fusion form on the surface of the cathode following separation of the contacts. This leads to the formation of metallic vapors that support the arc itself.
The diffuse arcis characterized by expansion over the contact surface itself and by evenly distributed thermal stress.
The electric arc is always the diffuse type at the interrupter's rated current value. The contact is only eroded very slightly and the number of interruptions is very high.
As the value of the interrupted current increases (beyond rated value), the electric arc tends to change from diffuse to contracted owing to the Hall effect.
Starting out from the anode, the arc contracts and tends to concentrate as the current rises. There is a temperature rise on a level with the affected area and the contact is consequently subjected to thermal stress.
To prevent the contacts from overheating and becoming eroded, the arc is made to rotate. By turning, the arc resembles a moving conductor through which current passes.

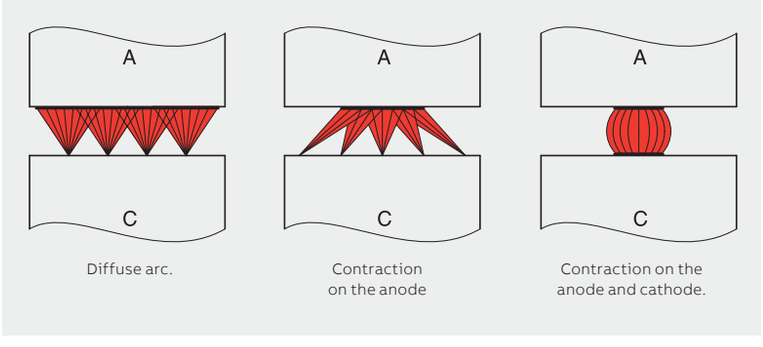
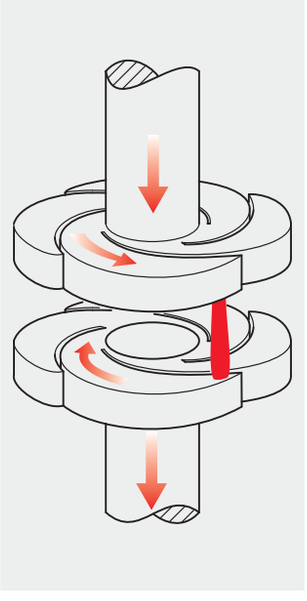
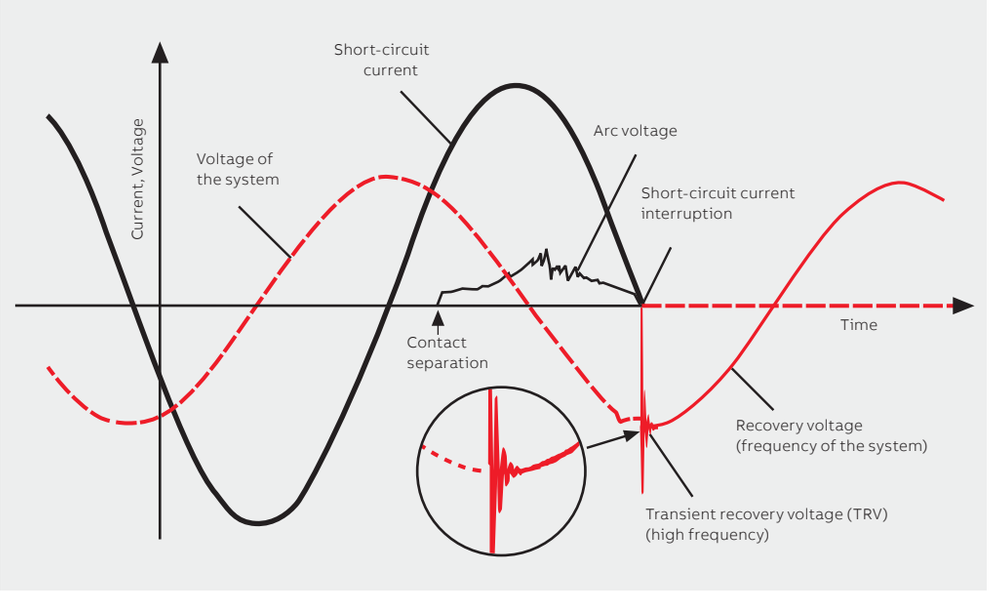


Diagram of transition from diffuse arc to contracted arc in a vacuum interrupter.

The spiral contacts of ABB vacuum interrupters
Thanks to their special shape, spiral contacts generate a radial magnetic field in all areas of the arc column, which concentrates over the contact circumferences.
A self-generated electromagnetic force acts tangentially, causing the arc to rapidly rotate around the contact axis.
The arc is forced to rotate and involve a wider surface than that of a fixed contracted arc.
Besides minimizing thermal stress on the contacts, this makes contact erosion negligible and above all, allows the interruption process to be controlled even with very high short-circuits.
ABB vacuum interrupters interrupt at the natural zero crossing, thereby preventing the arc from restriking after that event.
A rapidly reduced current charge and rapid condensation of the metal vapors at the same time as zero crossing, allows maximum dielectric strength to be restored between the interrupter contacts within microseconds.



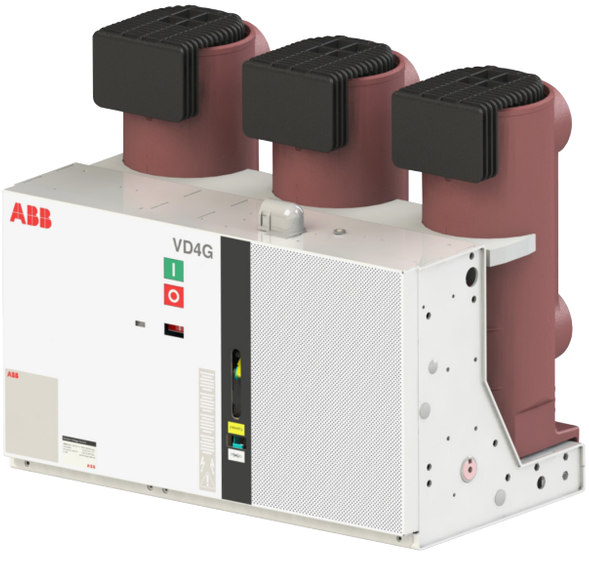
Geometry of radial magnetic field contact with a rotating vacuum arc.



Current and voltage trend evolution in a single phase during vacuum interruption.

2. Description

Vacuum circuit breakers for generator switching applications



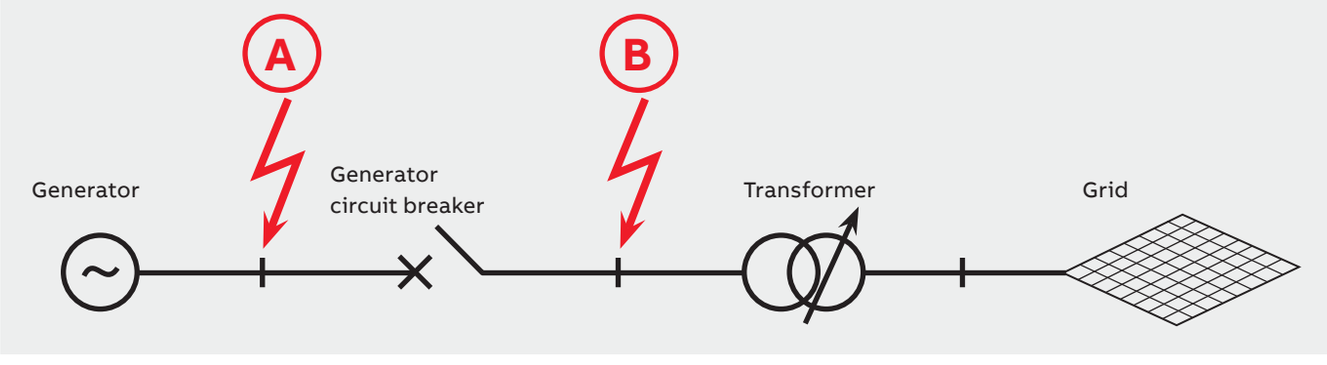
VD4G fixed version

A complete product line compliant with the latest Global Dual Logo IEC/IEEE 62271-37-013 Standard, featuring the familiar VD4 design for easy integration into existing installations.

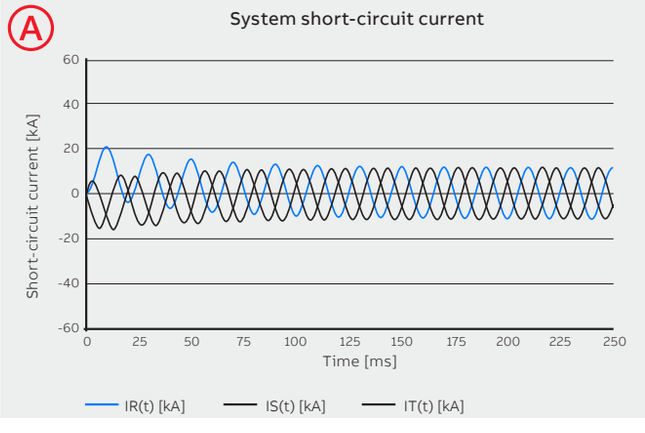
The VD4G breaker family is the first complete product line for generator switching applications developed in accordance with the most recent Dual Logo IEC/IEEE 62271-37-013 Standard.

Generator switching applications

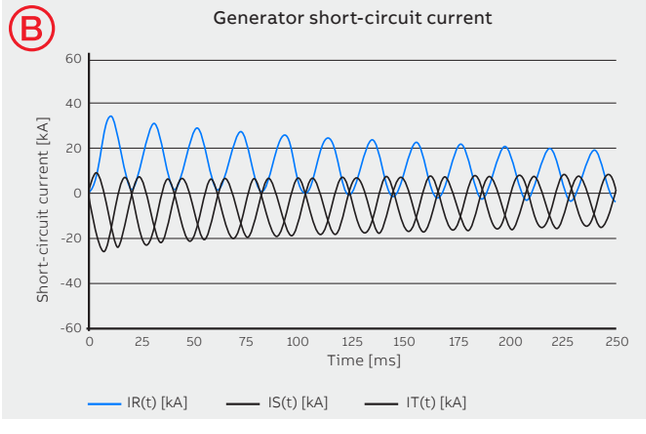
The globally expanding energy demand is increasingly covered by decentralized power plants and small installations using renewable resources. As the generated power is fed into the grid by step-up transformers and MV distribution boards, the VD4G family of vacuum circuit breakers offers a reliable and economical solution for protecting power plant assets.



Typical schematic of generator circuit breaker application



Failure location A: System-fed fault
Fast decaying DC component



Failure location B: Generator-fed fault
Slowly decaying and raised DC component results in delayed current zero.

The need to protect the grid, as well as the generator, from failures makes generator circuit breakers indispensable. The specific current shapes in this kind of application require dedicated circuit breakers tested for compliance with the specific duty defined by the latest Global Standard for Generator applications.
Each generator plant has specific technical characteristics. It is essential to perform a suitability analysis of the generator circuit breaker application for the purpose of selecting the solution able to fully meet your needs and ensure plant safety.

Available versions

VD4G circuit breakers are available in fixed and withdrawable versions with front operating mechanism.
The withdrawable version is available for UniGear ZS1, switchgear enclosures.

Fields of application

VD4G circuit breakers are used in power generation systems for generation for the full protection of power generation assets.

Standards

VD4G circuit breakers conform to IEC /IEEE 62271-37-013 Standards.
VD4G circuit breakers undergo the tests indicated below and guarantee the safety and reliability of the apparatus in service in any installation.

- **Type tests:** temperature rise, power frequency insulation withstand voltage, lightning impulse insulation withstand voltage, short-time and peak withstand current, mechanical life, short-circuit current making and breaking capacity.
- **Individual tests:** insulation of the main circuits with voltage at power frequency, auxiliary circuit and operating mechanism insulation, measurement of the main circuit resistance, mechanical and electrical operation.

Service safety

Safe distribution switchgear can be created with VD4G circuit breakers thanks to the complete range of mechanical and electric locks available on request.
The locking devices have been designed to prevent incorrect operations and allow the installations to be inspected whilst guaranteeing maximum safety for the operator.
The key locks and padlocks enable opening and closing and/or racking-in and out operations to be performed.
The closed door racking-out device only allows the circuit breaker to be racked-into or out of the switchgear with the door closed.
Anti-racking-in locks prevent circuit breakers with different rated currents from being racked in, and racking-in and out operations with the circuit breaker closed.

- Complete product line fully compliant with the latest Global Dual Logo IEC/IEEE 62271-37-013 Standards
- Same familiar VD4 design for easy integration into existing installations.
- Highly reliable operating mechanisms thanks to a low number of components manufactured by mass production systems
- Limited and simple maintenance
- Electrical accessories that can be easily and quickly installed or replaced thanks to wiring pre-engineered with plug-socket connectors
- Mechanical anti-pumping device included in standard equipment
- Built-in closing spring loading lever

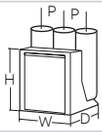
Accessories

VD4G circuit breakers are available with a full range of accessories to suit all installation requirements.
The operating mechanism has a standardized range of accessories and spare parts which are easy to identify and order.
The accessories are installed conveniently from the front of the circuit breaker. Plug-socket connectors are used for the electrical connections.
Operation and maintenance of the apparatus are simple and require limited use of resources.

3. Selection and ordering
Fixed circuit breakers

Fixed VD4G circuit breakers (15 kV)

Back view of fixed version VD4G

Circuit breaker			VD4G-25	VD4G-25 p210
Standards		IEC/IEEE 62271-37-013	•	•
Rated voltage		Ur [kV]	15	15
Rated insulation voltage		Us [kV]	15	15
Withstand voltage at 50 Hz	Rated value	Ud (1 min) [kV]	38 (**)	38 (**)
Impulse withstand voltage	Rated value	Up [kV]	95	95
Rated frequency		fr [Hz]	50-60	50-60
Rated current (40 °C)		Ir [A]	1250	1250
Rated breaking capacity (system-source)	Symmetrical short-circuit current	IscSFF [kA]	25	25
	DC component of breaking capacity	%	75	75
	Asymmetrical short-circuit current (system-source)	IascSFF [kA]	36.5	36.5
Rated breaking capacity (generator-source)	Symmetrical short-circuit current Iscg Class G1	IscGFF [kA]	16	16
	DC component of breaking capacity Class G1	%	110	110
	Symmetrical short-circuit current Iscg Class G2	IscGFF [kA]	16	16
	DC component of breaking capacity Class G2	%	130	130
Rated breaking current under out-of-phase conditions	Symmetrical short-circuit current	IscOOP [kA]	12.5	12.5
	DC component of breaking current	%	75	75
Making current		Ip [kA]	68.5	68.5
Rated operating sequence during short-circuit interruption			CO-10 min-CO	CO-10 min-CO
Short-time withstand current (3s)		Ik [kA]	25	25
Opening time		[ms]	33...60	33...60
Closing time		[ms]	30...60	30...60
Maximum overall dimensions		H [mm]	475	450
		W [mm]	450	570
		D [mm]	424	422
		Pole center-distance [mm]	150	210
Weight		[kg]	73	75
Standardized dimensions table		TN	1VCD003891	2RDA046582
Operating temperature		[°C]	- 5 ... + 40	- 5 ... + 40

(1) 4000 A with forced ventilation
(**) Contact ABB for higher values

Types of fixed circuit breakers available

The circuit breakers can be completed with the optional accessories indicated on the following pages.

Fixed VD4G circuit breaker (15 kV)							
Ur	**Isc**	**Rated current (40 °C) [A]**					
kV	**kA**	H = 475 D = 424 P = 150 W = 450	H = 450 D = 422 P = 210 W = 570	H = 610 D = 456 P = 210 W = 608	H = 636 D = 456 P = 275 W = 758	H = 636 D = 456 P = 275 W = 758	**Circuit breaker type**
15	25	1250	1250				**VD4G-25 15.12.25 p150** **VD4G-25 15.12.25 p210**
	40			1250			**VD4G-40 15.12.40 p210**
	40			1600			**VD4G-40 15.16.40 p210**
	40			2000			**VD4G-40 15.20.40 p210**
	40				2000		**VD4G-40 15.20.40 p275**
	40					3150 (1)	**VD4G-40 15.32.40 p275**
	50			1250			**VD4G-50/25 15.12.50 p210**
	50			1600			**VD4G-50/25 15.16.50 p210**
	50			2000			**VD4G-50/25 15.20.50p210**
	50					3150 (1)	**VD4G-50 15.32.50 p275**
	63					3150 (1)	**VD4G-63 15.32.63 p275**

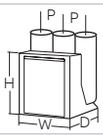
H = Height of circuit breaker
D = Depth of circuit breaker
P = Horizontal center distance of pole
W = Width of circuit breaker
(1) 4000 A with forced ventilation

VD4G-40				**VD4G-50/25**	**VD4G-50/50**		**VD4G-63**	
•				•	•		•	
15				15	15		15	
15				15	15		15	
38 (**)				38 (**)	38		38 (**)	
95				95	95		95	
50-60				50-60	50-60		50-60	
≤2000	2000	3150	4000 (1)	≤2000	3150	4000 (1)	3150	4000 (1)
40	40	40	40	50	50	50	63	63
75	75	75	75	75	75	75	75	75
58.5	58.5	58.5	58.5	73	73	73	92	92
25	25	25	25	25	50	50	50	50
110	110	110	110	110	110	110	110	110
25	25	25	25	25	37	37	37	37
130	130	130	130	130	130	130	130	130
20	20	20	20	25	25	25	31.5	31.5
75	75	75	75	75	75	75	75	75
115	115	115	115	144	137	137	173	173
CO-10 min-CO				CO-30 min-CO	CO-30 min-CO		CO-30 min-CO	
40	40	40	40	50	50 (4s)	50 (4s)	63 (2s)	63 (2s)
33...60	33...60	33...60	33...60	33...60	28 ÷ 40	28 ÷ 40	28 ÷ 40	28 ÷ 40
30...60	30...60	30...60	30...60	30...60	≤55	≤55	≤55	≤55
610	610	636	636	610	636	636	636	636
608	758	758	758	608	750	750	750	750
456	456	456	456	456	459	459	459	459
210	275	275	275	210	275	275	275	275
146	158	177	177	147	210	210	210	210
1VCD000240	1VCD000241	1VCD000242	1VCD000242	2RDA038045	1VCD003935	1VCD003935	1VCD003935	1VCD003935
- 5 ... + 40				- 5 ... + 40	- 5 ... + 40		- 5 ... + 40	

3. Selection and ordering
Withdrawable circuit breakers

Withdrawable circuit breakers
for Unigear ZS1 switchgear(*) (15 kV)

View of withdrawable version VD4G

Circuit breaker			**VD4G-25**	**VD4G-25 p210**
Standards		IEC/IEEE 62271-37-013	•	•
Rated voltage		Ur [kV]	15	15
Rated insulation voltage		Us [kV]	15	15
Withstand voltage at 50 Hz	Rated value	Ud (1 min) [kV]	38 (**)	38 (**)
Impulse withstand voltage	Rated value	Up [kV]	95	95
Rated frequency		fr [Hz]	50-60	50-60
Rated current (40 °C)		Ir [A]	1250	1250
Rated breaking capacity (system-source)	Symmetrical short-circuit current	IscSFF [kA]	25	25
	DC component of breaking capacity	%	75	75
	Asymmetrical short-circuit current (system-source)	IascSFF [kA]	36.5	36.5
Rated breaking capacity (generator-source)	Symmetrical short-circuit current Iscg Class G1	IscGFF [kA]	16	16
	DC component of breaking capacity Class G1	%	110	110
	Symmetrical short-circuit current Iscg Class G2	IscGFF [kA]	16	16
	DC component of breaking capacity Class G2	%	130	130
Rated breaking current under out-of-phase conditions	Symmetrical short-circuit current	IscOOP [kA]	12.5	12.5
	DC component of breaking current	%	75	75
Making current		Ip [kA]	68.5	68.5
Rated operating sequence during short-circuit interruption			CO-10 min-CO	CO-10 min-CO
Short-time withstand current (3s)		Ik [kA]	25	25
Opening time		[ms]	33...60	33...60
Closing time		[ms]	30...60	30...60
Maximum overall dimensions 		H [mm]	627	628
		W [mm]	503	653
		D [mm]	662	661
		Pole center-distance P [mm]	150	210
Weight		[kg]	116	135
Standardized dimensions table		TN	1VCD000233	2RDA046589
Operating temperature		[°C]	- 5 ... + 40	- 5 ... + 40

([1]) 4000 A with forced ventilation
(*) Contact ABB for withdrawable circuit breakers VD4G for PowerCube enclosure
(**) Contact ABB for higher values

Types of withdrawable circuit breakers available for UniGear ZS1 switchgear

The circuit breakers can be completed with the optional accessories indicated on the following pages.

Withdrawable VD4AG circuit breaker (15 kV)							
Ur	**Isc**	**Rated current (40 °C) [A]**					
		H = 627	H = 628	H = 698	H = 743	H = 735	
kV	**kA**	D = 662	D = 661	D = 643	D = 643	D = 650	**Circuit breaker type**
		P = 150	P = 210	P = 210	P = 275	P = 275	
		W = 503	W = 653	W = 653	W = 853	W = 851	
15	25	1250	1250				**VD4G/P-25 15.12.25 p150** **VD4G/P-25 15.12.25 p210**
	40			1250			**VD4G/P-40 15.12.40 p210**
	40			1600			**VD4G/P-40 15.16.40 p210**
	40			2000			**VD4G/P-40 15.20.40 p210**
	40				2000		**VD4G/P-40 15.20.40 p275**
	40					3150 (1)	**VD4G/P-40 15.32.40 p275**
	50			1250			**VD4G/P-50/25 15.12.50 p210**
	50			1600			**VD4G/P-50/25 15.16.50 p210**
	50			2000			**VD4G/P-50/25 15.20.50 p210**
	50					3150 (1)	**VD4G/P-50 15.32.50 p275**

H = Height of circuit breaker
D = Depth of circuit breaker
P = Horizontal center distance of pole
W = Width of circuit breaker
(1) 4000 A with forced ventilation

VD4G-40				**VD4G-50/25**	**VD4G-50/50**	
•				•	•	
15				15	15	
15				15	15	
38 (**)				38 (**)	38	
95				95	95	
50-60				50-60	50-60	
≤2000	2000	3150	4000 (1)	≤2000	3150	4000 (1)
40	40	40	40	50	50	50
75	75	75	75	75	75	75
58.5	58.5	58.5	58.5	73	73	73
25	25	25	25	25	50	50
110	110	110	110	110	110	110
25	25	25	25	25	37	37
130	130	130	130	130	130	130
20	20	20	20	25	25	25
75	75	75	75	75	75	75
115	115	115	115	144	137	137
CO-10 min-CO				CO-30 min-CO	CO-30 min-CO	
40	40	40	40	50	50	50
33...60	33...60	33...60	33...60	33...60	28 ÷ 40	28 ÷ 40
30...60	30...60	30...60	30...60	30...60	≤55	≤55
698	698	743	743	698	735	735
653	853	853	853	653	851	851
643	643	643	643	643	650	650
210	275	275	275	210	275	275
190	205	221	221	191	270	270
1VCD000234	1VCD000243	1VCD000244	1VCD000244	2RDA03805	1VBM700160	
- 5 ... + 40				- 5 ... + 40	- 5 ... + 40	

3. Selection and ordering

Optional accessories for VD4G up to 50/25 kA and EL actuator

1 Shunt opening release (-MBO1)

Allows opening command of apparatus to be enabled by remote control.

This release is suitable for both instantaneous and permanent duty. However, an auxiliary contact -BGB1 de-energizes it after circuit breaker has opened. In the case of instantaneous service, the current impulse must last at least 100 ms.

This release can be controlled by the following devices: coil continuity control (CCC), opening circuit supervision (TCS)(*) or the ABB STU functionality control device (see accessory 16, supplied on request).

Characteristics	
Un	48-110...125 - 220...250 V DC
Un	110...125-220...250 V AC 50-60 Hz
Operating limits	in accordance with IEC/ IEEE 62271-37-013
Inrush power (Ps)	60...100 W / VA
Continuous power consumption (Pc)	1.5 W
Electronics self-consumption (no coil supplied); value independent of voltage applied	1.5 mA
Opening time	33...60 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

(*) The minimum current that the relay with TCS function (used for monitoring coil continuity) detects as a condition denoting that the trip circuit is operating correctly (specified for each relay in the relative manual), must be sensibly higher than the current consumption of the actual coil (~1.5 mA).
If this fails to occur, always add, in parallel to the TCS, a circuit able to absorb sufficient current to compensate the gap while preventing the total current in the TCS circuit from rising above the maximum threshold (Itcs <10 mA for High Voltage coils - from 110V to 250V, and Itcs <50 mA for Low Voltage coils from 24 V to 60 V). A simple resistor can be sized for the purpose, depending on the parameters of the TCS and the auxiliary voltage range used.

2 Additional shunt opening release (-MBO2)

Similarly to shunt opening release -MBO1, this allows the opening command of the apparatus to be transmitted by remote control. It can be powered by the same circuit as main shunt opening release -MBO1 or by a circuit that is completely separate from release -MBO1.

This release is suitable for both instantaneous and permanent duty. However, an auxiliary contact -BGB1 de-energizes it after the circuit breaker has opened.

To guarantee the release action, the current impulse must last at least 100 ms.

Continuity functionality can be checked with a continuity control device (CCC), opening circuit supervision (TCS)(*) or the STU functionality control device (see accessory 16, supplied on request).

- -MBO2 has the same electrical and operating characteristics as release -MBO1.

MBO1: Shunt opening release

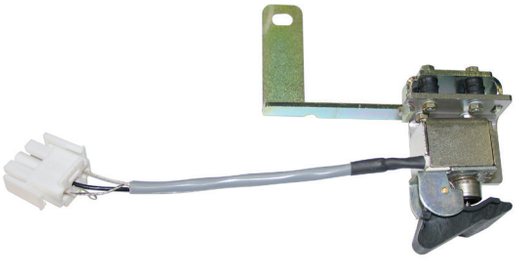
MBO2: Additional shunt opening release

3 Opening solenoid (-MBO3)

The opening solenoid (-MBO3) is a special demagnetization release to be used in conjunction with a self-supplied overcurrent protection relay.
It is situated in the operating mechanism (left-hand side) and is not an alternative to the additional shunt opening release (-MBO2).
It is not available for 40 and 50 kA circuit breakers.
Should this accessory be required, it must be requested at the time of order since subsequent application by the customer is not possible.
Note: the compatible protection relays are listed in document: Data sheet 1VCD600854.
The opening solenoid (-MBO3) is available in two versions:

- For DC (release by discharging energy stored in protection relay against self-supplied overcurrent)
- For AC (release by means of the energy supplied by an adder transformer on the secondaries of the protection current transformers) (CT is at customer's charge)

(*) The minimum current that the relay with TCS function (used for monitoring coil continuity) detects as a condition denoting that the trip circuit is operating correctly (specified for each relay in the relative manual), must be sensibly higher than the current consumption of the actual coil (~1.5 mA).
If this fails to occur, always add, in parallel to the TCS, a circuit able to absorb sufficient current to compensate the gap while preventing the total current in the TCS circuit from rising above the maximum threshold (Itcs < 10 mA for High Voltage coils - from 110V to 250V, and Itcs < 50 mA for Low Voltage coils from 24 V to 60 V).
A simple resistor can be sized for the purpose, depending on the parameters of the TCS and the auxiliary voltage range used.



MBO3: Opening solenoid

4 Shunt closing release (-MBC)

Allows closing command of apparatus to be transmitted by remote control.
This release is suitable for both instantaneous and permanent duty. An auxiliary contact that de-energizes it after the circuit breaker has closed is not envisaged.
The permanently supplied release provides the electrical anti-pumping function with both electrical opening and re-closing commands maintained. To guarantee the closing action, the current impulse must last at least 100 ms.
If there is the same supply voltage for shunt closing release -MBC and under-voltage release -MBU and the circuit breaker must close automatically when auxiliary voltage returns, there must be a delay of at least 50 ms between under-voltage release energizing and energizing of the shunt closing release to allow the closing operation to take place. Continuity functionality can be checked with a continuity control device (CCC), opening circuit supervision (TCS)(*) or the STU functionality control device (see accessory 16, supplied on request).

Characteristics	
Un	110...125-220...250V DC
Un	110...125-220...250V AC 50-60Hz
Operating limits	according to IEC/IEEE 62271-37-013
Inrush power (Ps)	60...100 W/VA
Continuous power consumption (Pc)	1.5 W
Electronics self-consumption (no coil supplied; value independent of voltage applied	1.5 mA
Opening time	33...60 ms
Insulation voltage	2000V 50Hz (for 1 min)

MBC : Shunt closing release

3. Selection and ordering

Optional accessories for VD4G up to 50/25 kA and EL actuator

5 Auxiliary contacts of the circuit breaker (-BGB1)

Electrical signaling of circuit breaker open/closed can be obtained with a group of 10, 16 or 20 auxiliary contacts for the fixed version and 10 or 16 auxiliary contacts for the withdrawable version. The standard equipment comprises 10 auxiliary contacts.

Note

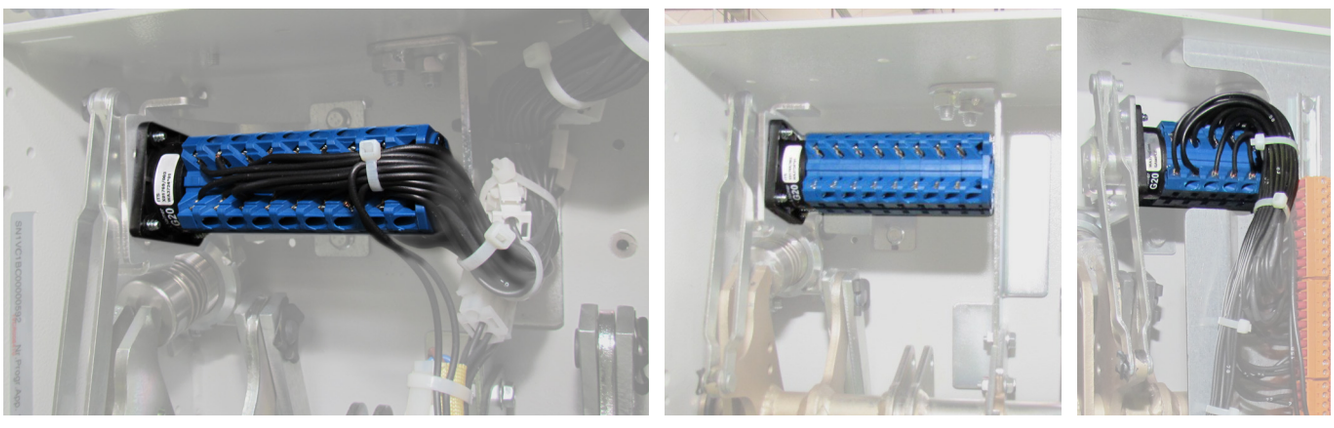
The following are available using the standard group of ten auxiliary contacts and the maximum number of electrical accessories:

- for fixed circuit breakers: three closing contacts "a" for signaling circuit breaker open and five opening contacts "b" for signaling circuit breaker closed;
- for withdrawable circuit breakers: three closing contacts "a" for signaling circuit breaker open and four opening contacts "b" for signaling circuit breaker closed;
- Fixed circuit breakers are available with two finishing accessories (to be specified when ordering):
  - non-wired auxiliary contacts; wiring to the terminals of the contacts is at the customer's charge (photo below left; the terminal box to which the other electrical accessories are wired is at the top); ask for instructions 1VCD601204 (available in the main languages) which describe how to remove, wire the auxiliary contacts more easily and fit the auxiliary contacts unit back into its housing;
  - auxiliary contacts already wired to the terminal box (see photo at top right)

Consult circuit diagrams 1VCD400151 for fixed circuit breakers and 1VCD400155 for withdrawable circuit breakers.

Note

The main shunt opening release and/or the additional shunt opening release use 1 and/or 2 closing contacts "a", thereby reducing the number of auxiliary contacts available. Always check the maximum number of contacts available if the equipment is non-standard.



Pictures showing the different available circuit breaker auxiliary contacts, based on the selected configuration

The new layouts can be interchanged with the existing ones, with the following exceptions:
- diagram 1VCD400151 (substitutes 1VCD400046 and 1VCD400099)
- fig. 34 on the previous diagrams is represented by fig. 31 + fig. 32 on the new diagram;
- fig. 33 and fig. 35 on the previous diagrams are not available with the new layout
- diagram 1VCD400155 (substitutes 1VCD400047)

Auxiliary contacts –BGB1 conform to the following standards/regulations/directives:
- IEC 62271-100
- IEEE C37.54
- EN 61373 cat.1 class B / impact and vibration test
- Germanish Loyd regulation / vibrations envisaged by the shipping registers
- UL 508
- EN 60947 (DC-21A DC-22A DC-23A AC-21A)
- RoHS Directive

General characteristics	
Insulation voltage to standard VDE 0110, Group C	660 V AC 800 V DC
Rated voltage	24 V ... 660 V
Test voltage	2 kV for 1 min
Maximum rated current	10 A - 50/60 Hz
Breaking capacity	Class 1 (IEC 62271-1)
Number of contacts	5
Groups of contacts	10 / 16 / 20
Contact travel	90°
Actuating force	0.66 Nm
Resistance	<6.5 mΩ
Storage temperature	–30 °C ... +120 °C
Operating temperature	–20 °C ... +70 °C (-30° ref. ANSI 37.09)
Contact overtemperature	10 K
Mechanical life	30.000 mechanical operations
Protection class	IP20
Cable section	1 mm²

Electrical characteristics (according to IEC 60947)		
Rated current Un		Breaking capacity (10000 interruptions)
220 V AC	Cosφ = 0.70	20 A
220 V DC	Cosφ = 0.45	10 A
24 V DC	1 ms	12 A
	15 ms	9 A
	50 ms	6 A
60 V DC	1 ms	10 A
	15 ms	6 A
	50 ms	4.6 A
110 V DC	1 ms	7 A
	15 ms	4.5 A
	50 ms	3.5 A
220 V DC	1 ms	2 A
	15 ms	1.7 A
	50 ms	1.5 A
250 V DC	1 ms	2 A
	15 ms	1.4 A
	50 ms	1.2 A

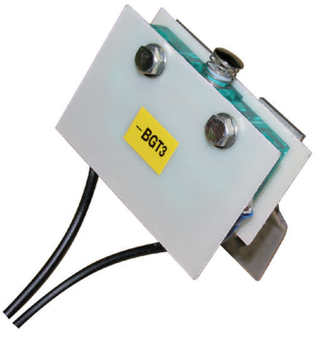
Electrical characteristics (according to IEC 62271-100 class 1)	
Rated current Un	Breaking capacity
24 V DC 20 ms	18.8 mA
60 V DC 20 ms	7.4 mA
110 V DC 20 ms	4.2 mA
250 V DC 20 ms	1.8 mA

3. Selection and ordering

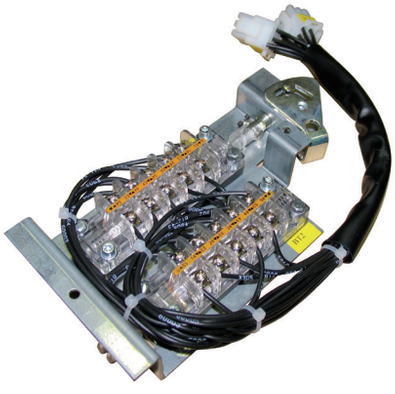
Optional accessories for VD4G up to 50/25 kA and EL actuator

6 Position contact (-BGT3)
This contact is used together with the locking magnet in operating mechanism (-RLE1) to prevent remote closing during racking-into the unit.
It is only supplied for withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube modules.
It cannot be supplied when the transmitted contacts are required in the truck (-BGT1; -BGT2).

7 Transmitted contacts in truck (-BGT1; -BGT2)
Transmitted contacts of withdrawable circuit breaker (installed in circuit breaker truck - only for VD4G/P withdrawable circuit breaker).
These contacts are provided either in addition or as an alternative to the position contacts (for signaling circuit breaker racked out) located in the unit. They also perform the function of position contact (-BGT3).
Contacts -BGT1 and BGT2 have the same general and electrical characteristics as auxiliary contacts.



BGT3: Position contact



BGT1-BGT2:Transmitted contacts in truck

8 Motor operator (-MAS)

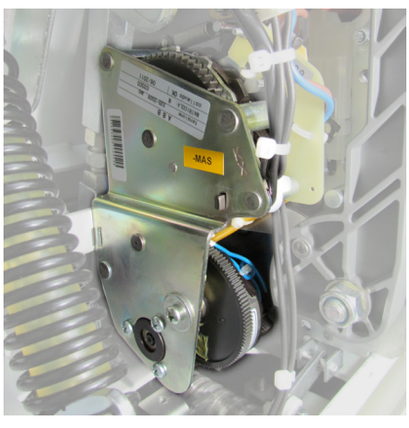
The motor operator automatically loads the closing spring of the circuit breaker operating mechanism. After the circuit breaker has closed, the geared motor immediately reloads the closing springs.
In a power failure or during maintenance work, the closing spring can always be loaded by hand (using the special crank handle built into the operating mechanism).

Characteristics		
Un	48 - 110...125 - 220...250 V–	
Un	110...125 - 220...250 V~ 50/60 Hz	
Operating limits	85 ... 110% Un	
Power on inrush (Ps)	≤ 40 kA	50 kA
	DC = 600 W; AC = 600 VA	DC = 900 W; AC = 900 VA
Rated power (Pn)	DC = 200 W; AC = 200 VA	DC = 350 W; AC = 350 VA
Loading time	6-7 s	6-7 s
Insulation voltage	2000 V 50 Hz (for 1 min)	2000 V 50 Hz (for 1 min)

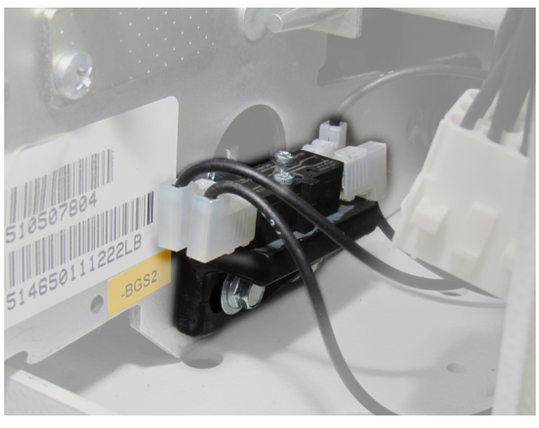
9 Contact for signalling closing spring loaded/ discharged (-BGS2)

Consists of a microswitch which remotely signals the state of the closing spring of the circuit breaker operating mechanism.
The following signals can be transmitted:
- contact open: signaling spring loaded
- contact closed: signaling spring discharged

The two signals must be used for circuits with the same power supply voltage.



MAS: Motor Operator



BGS2: Contact for signalling closing spring loaded/discharged

3. Selection and ordering
Optional accessories for VD4G up to 50/25 kA and EL actuator

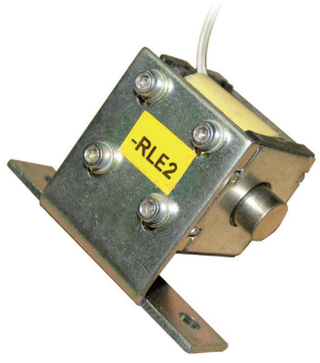
10 Locking magnet on operating mechanism (-RLE1)
Only allows activation of the command with the supplied electromagnet.
The locking electromagnet in the operating mechanism has the same electrical characteristics as shunt closing release -MBC.

Protections and locks

11 Locking magnet on truck (-RLE2)
This accessory is compulsory for withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube modules. Prevents circuit breaker racking-into the switchgear when the auxiliary circuit plug is disconnected.
This plug also acts as an anti-insertion lock when the rated currents differ from each other. Special striker pins prevent the plug from being fitted into the socket if the rated current of the circuit breaker is lower than the rated current of the panel.
This accessory is not available when the motor-operated truck is required.

Characteristics	
Un	48 - 110 - 125 - 220 - 250 V–
Un	110 - 125 - 220 - 250 V~ 50/60 Hz
Operating limits	according to IEC/ IEEE 62271-37-013
Nominal power (Pn)	DC 250 W; AC = 250 VA
Continuous power (Pc)	DC = 5 W; AC = 5 VA
Inrush duration	150 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

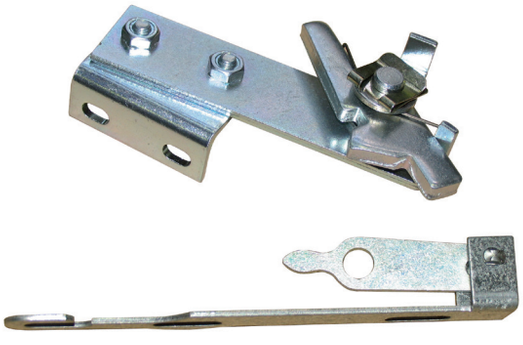
RLE1: Locking magnet on operating mechanism



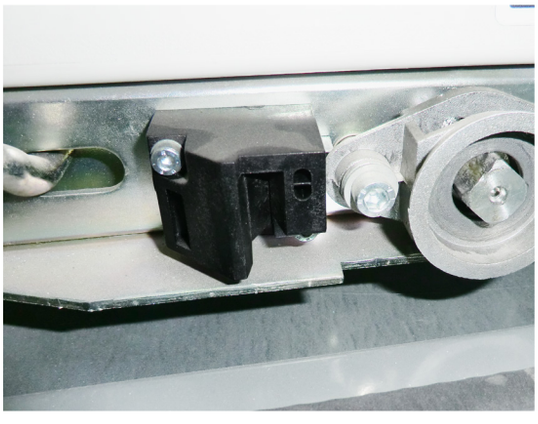
Locking magnet on truck

12 Interlock for fixed circuit breaker
Device for fixed circuit breakers converted into withdrawable ones by the customer. It allows the customer to make a mechanical lock to prevent racking-out/in with the circuit breaker closed, and the circuit breaker from closing as it travels. Note: The device must be requested when ordering since it must be assembled and tested in the factory.

13 Mechanical door interlock
This device prevents circuit breaker racking-in when the switchgear door is open. It is only provided for circuit breakers used in UniGear ZS1 switchgear and PowerCube modules fitted with a special actuator on the door.



Interlock for fixed circuit breaker



Mechanical door interlock

3. Selection and ordering

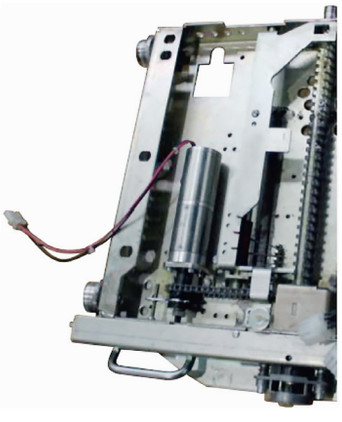
Optional accessories for VD4G up to 50/25 kA and EL actuator

14 Motor-operated truck (-MAT)
Allows the circuit breaker to be racked into and out of the switchgear via remote control (only withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube modules).
The motor version with clutch can be ordered on request and allows racking-in/ out to be performed in an emergency if the truck motor fails to operate.

Characteristics	
Un	48 - 110 - 125 -220 V–
Operating limits	85 ... 110% Un
Rated power (Pn)	40 W

15 STU Shunt Test Unit
Owing to their construction, the functionality of the shunt closing (-MBC) and opening (-MBO1, -MBO2) releases cannot be checked with dedicated relays (e.g. TCS Test Control Supervision, CCC Control Coil Continuity) or with the REF control and protection unit. The only device able to check this functionality is the STU Shunt Test Unit. Please contact us if you want to check this functionality using devices other than STU.
This device can be used in conjunction with shunt opening release (-MBO1; -MBO2) or shunt closing release (-MBC) for the purpose of checking functionality and continuity.
The Shunt Test Unit is used to check the continuity of releases with rated operating voltage between 24 V and 250 V (AC and DC), as well as the functionality of the electronic circuit of the release.
Continuity is checked cyclically with an interval of 20 seconds between one test and the next.
LEDs on the front provide optical signals. The following information is given:

- POWER ON: power supply present
- (-MBO) TESTING: test in progress
- TEST FAILED: signal given if a test fails or in the absence of auxiliary power supply
- ALARM: signal given after three failed tests.



MAT: Motor operated truck

Test Unit

Two relays and a changeover contact are also available on the unit for remote signaling of the following two events:

- test failure (resetting occurs automatically when the alarm stops)
- failure of three tests (resetting can only be performed by means of the manual - RESET – button from the front of the unit).

Characteristics	
Un	24 ... 250 V AC/DC
Maximum interrupted current	6 A
Maximum interrupted voltage	250 V AC

16 Undervoltage release

According to Dual Logo standard, the requirement stated in IEC 62271-1, subclause 6.9.5., is not applicable. In case under-voltage release is needed, please contact ABB confirming the awareness of this prescription.

Selection and ordering
Optional accessories

Optional accessories for VD4G-50/50 and VD4G-63 with classic operating mechanism

1 Shunt opening release -MO1 (-Y2)

The shunt opening release allows apparatus to be opened by remote control and is art of the basic equipment.

An auxiliary contact -BB2 (-S4) always de-energizes it after opening.

Characteristics	
Ua: 24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-	
Ua: 110 - 125 - 220 - 240 V ~ 50 ... 60 Hz	
Service tolerances:	DC 70 ... 110% Ua
	AC 85 ... 110% Ua
Short-term power consumption:	approx. DC 250 W; approx. AC 250 VA
Admissible maximum operating time:	8 s

2 Additional shunt opening release -MO2 (-Y9)

The additional shunt opening release has the same function as shunt opening release -MO1 (-YO2).

The additional shunt opening release is available on request and requires use of auxiliary contact -BB1 (-S3), which is part of the standard equipment.

Characteristics	
Ua: 24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-	
Ua: 100 - 110 - 125 - 220 - 230 - 240 V ~ 50 ... 60 Hz	
Service tolerances:	DC 70 ... 110% Ua
	AC 85 ... 110% Ua
Short-term power consumption:	approx. DC 250 W; approx. AC 250 VA
Admissible maximum operating time:	8 s

3 Shunt closing release -MC (-Y3)

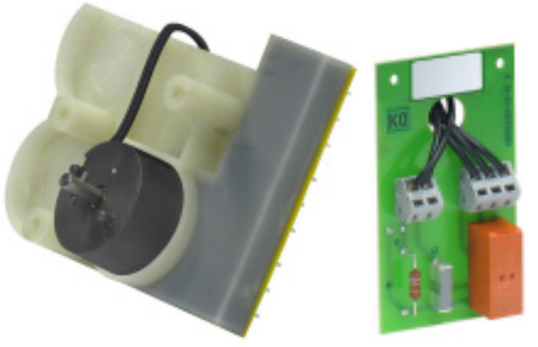
The shunt closing release allows the circuit breaker to be closed by remote control and is part of the basic equipment.
Auxiliary contact -BS1 (-S1) cuts off the power supplied to the release after the closing springs have been loaded, while auxiliary contact -BB1 (-S3) cuts off the power supplied to the release after the circuit breaker has closed.
Both are required and are part of the standard equipment.
The shunt closing release is optional in circuit breakers with manual opening mechanisms but mandatory for circuit breakers with motor-operated drives.
Application of the shunt closing release includes anti-pumping relay -K0.
The permanently supplied release provides the electrical anti-pumping function with both electrical opening and re-closing commands maintained.
Circuit breaker closing is only re-enabled once the active closing command has been interrupted.

Characteristics	
Ua: 24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-	
Ua: 110 - 125 - 220 - 240 V ~ 50 ... 60 Hz	
Service tolerances:	DC 70 ... 110% Ua
	AC 70 ... 110% Ua
Short-term power consumption:	approx. DC 250 W; approx. AC 250 VA
Admissible maximum operating time:	8 s

4 Locking magnet on operating mechanism RL1 (-Y1) with auxiliary contacts -BL1 (-S2)

Only allows the operating mechanism to be activated when the electromagnet is energized and it is part of the basic equipment.
To enable the circuit breaker to close, the locking magnet must be energized for at least 100 ms before the circuit breaker closing command.
Auxiliary contact -BL1 (-S2) is required and is part of the standard equipment.

Characteristics	
Ua: 24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-	
Ua: 100 - 110 - 125 - 220 - 230 - 240 V ~ 50 ... 60 Hz	
Service tolerances:	DC 85 ... 110% Ua
	AC 85 ... 110% Ua
Short-term power consumption:	approx. DC 10 W; approx. AC 10 VA
Admissible maximum operating time:	unlimited



Selection and ordering
Optional accessories

5 Undervoltage release -MU (-Y4)

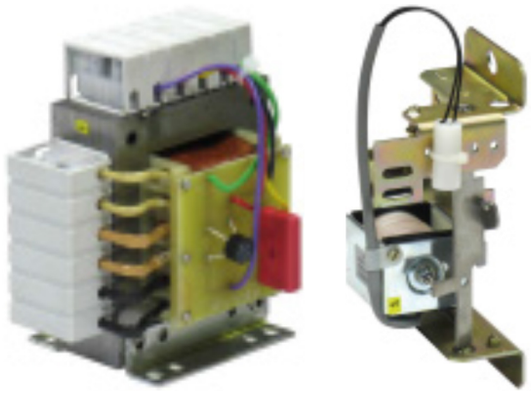
According to Dual Logo standard, the requirement stated in IEC 62271-1, subclause 6.9.5, is not applicable. In case under-voltage release is needed, please contact ABB confirming the awareness of this prescription.
The undervoltage release opens the circuit breaker when there is an appreciable drop or lack of the voltage that supplies it.
It trips when the auxiliary voltage is between 70% and 30% of its rated value.
The circuit breaker can only close again when the voltage reaches 85% of its rated value.
The undervoltage release trips instantaneously, but can also be accompanied by an electronic time-lag device.

Characteristics of the non-delayed version	
Ua: 24 - 30 - 48 - 60 - 110 - 125 - 220 V-	
Ua: 100 - 110 - 125 - 220 V ~ 50 ... 60 Hz	
Power consumption:	approx. DC 10 W
	approx. AC 11 VA
Maximum service tolerance:	110% Ua
Voltage for readiness closing:	> 85% UN
Trip voltage:	30 ... 70% Ua
Operating time:	immediate
Admissible maximum operating time:	none

6 Opening solenoid -MO3 (-Y7)

Use of the overcurrent release may be advisable in systems where the auxiliary voltage is unable to provide reliable continuity of service.
The release must receive the opening pulse on the basis of the current from the secondary winding of an intermediate current transformer or a delayed overvoltage relay.
During continuous service, the secondary winding of the MO3 is short-circuited by an auxiliary contact.

Characteristics	
Power consumption in continuous service mode:	connection to 2 phases 35 VA connection to 3 phases 2 VA
Trippping power consumption:	approx. 15 VA
Readiness tripping:	70% IN
Power consumption of intermediate current transformer at IN = 5 A and continuous operation (short-circuited secondary winding):	Winding A 1 VA Winding B 1 VA Winding C 1.5 VA
Power consumption of intermediate current transformer at IN = 5 A and continuous operation (open secondary winding):	Winding A 15 VA Winding B 15 VA Winding C 25 VA
Primary current of intermediate current transformer:	3 x 5
Secondary current of intermediate current transformer:	~ 0.4 A



7 Auxiliary contacts of circuit breaker -BS1, -BB1, -BB2, -BB3 (S1, S3, S4, S5)

The circuit breaker can be equipped with five-pole auxiliary contacts for monitoring, interlocking and signaling. Auxiliary contact -BB2 (-S4) is part of the basic equipment of all circuit breakers with motor-driven operating mechanisms.
Auxiliary contact -BB3 (-S5) is optional.
Also consult the circuit-diagram.

Characteristics	
Ua:	24 (*) ... 250 V
Test voltage:	2.5 kV
Rated current:	Ith^2 = 10 A

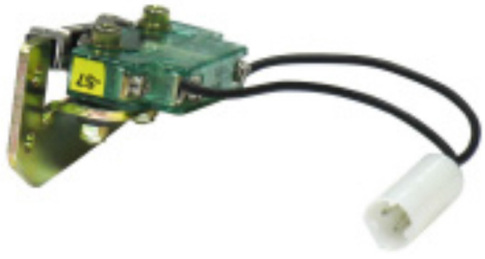
(*) For application at 24Vdc and with currents lower than 10 mA golden contacts are recommended.

8 Auxiliary contact for signaling effective opening -BB4 (-S7)

Auxiliary contact -BB4 (-S7), also known as transient contact, is part of the basic equipment of all circuit breakers.
It is used for signaling effective opening of the circuit breaker (the transient signal lasts 30ms).

Characteristics	
Ua:	24 (*) ... 250 V
Test voltage:	2.5 kV
Rated current:	Ith^2 = 10 A

(*) For application at 24Vdc and with currents lower than 10 mA golden contacts are recommended.



Selection and ordering
Optional accessories

9 Transmitted contacts in truck -BT1, -BT2 (-S8, -S9)

The auxiliary contacts signal whether the circuit breaker is racked in or out.
In the intermediate position, the circuit breaker is mechanically interlocked.

Characteristics	
Ua:	24 (*) ... 250 V
Test voltage:	2.5 kV
Rated current:	Ith^2 = 10 A

(*) For application at 24Vdc and with currents lower than 10 mA golden contacts are recommended.

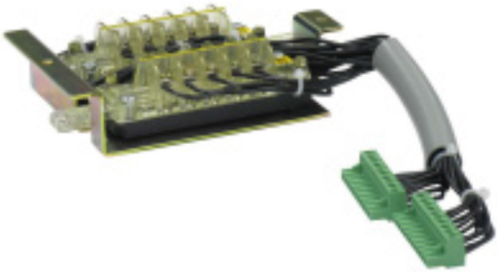
10 Motor-operated drive -MS (-M0)

The spiral spring of circuit breakers with motor-operated drive is automatically loaded by an electric motor installed in the actual drive on the load side of each closing operation. The motor operated drive is part of the basic equipment of the apparatus.

Characteristics	
Ua:	24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-
Ua:	110 - 240 V ~ 50 ... 60 Hz
Loading time:	max. 15 s
Reloading time:	max. 15 s
Service tolerances:	85 ... 110% Ua
Power consumption during loading:	approx. DC 230 ... 260 W; approx. AC 260 VA
Weight:	1.5 kg

Fuse motor:

rated supply voltage	power consumption	Fuse motor (ABB-Stotz mcb)	loading time (maximum)
V	VA/W	A	S
AC 110	260	1.6 S 281 UC-K	10
220	260	0.75	10
240	260	0.75	10
DC 110	230	1.60	10
125	260	1.60	10
220	240	0.75	10
240	260	0.75	10
24			15
30			15
48			15
60			15



Properties of Gefeg motor	
Ua:	24 - 48 - 60 - 110 - 125 - 220 - 240 V-
Ua:	110 - 240 V ~ 50 ... 60 Hz
Loading time:	max. 15 s
Reloading time:	max. 15 s
Service tolerances:	85 ... 110% Ua
Power consumption during loading:	app. DC 130 ... 140 W; app. AC 150 – 170 VA
Weight:	1.5 kg

Fuse motor:

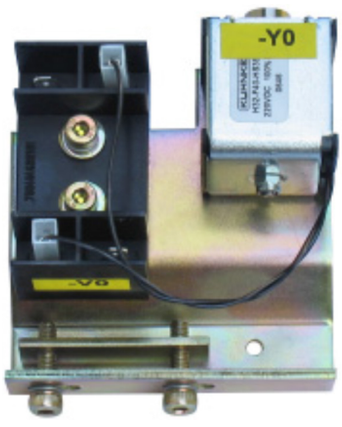
rated supply voltage	power consumption	Fuse motor (ABB-Stotz mcb)	loading time (maximum)
V	VA/W	A	S
AC 110	150	1.6 S 281 UC-K	15
220	150	0.75	15
240	170	0.75	15
DC 24	130	4.0 S 282 UC-K	15
48	130	3.00	15
60	130	2.00	15
110	140	1.00 / 1.60 *	10
125	160	1.00 / 1.60 *	15
220	140	0.75	15
240	150	0.75	15

* VD4 63 kA motor

11 Locking magnet on truck -RL2 (-Y0)

The locking magnet on the truck prevents circuit breaker travel in the absence of auxiliary voltage.

Characteristics	
Ua:	24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-
Ua:	100 - 110 - 125 - 220 - 230 - 240 V ~ 50 ... 60 Hz
Service tolerances:	DC; AC 85 ... 110% Ua
Power consumption:	approx. DC 10 W; approx. AC 10 VA
Admissible maximum operating time:	unlimited



4. Specific product characteristics

Environmental protection program

VD4 circuit breakers are manufactured in accordance with ISO 14000 Standards (Guidelines for environmental management).
The manufacturing processes take place in compliance with the environmental protection standards as to reduced energy consumption, use of raw materials and the production of waste. Production complies with the environmental management system implemented in the medium voltage apparatus manufacturing facility.
Assessment of the environmental impact of every stage in a product's life cycle is a method used by ABB to develop environmentally compatible components and systems. This goal is pursued by minimizing energy consumption and the overall use of raw materials. A policy that begins when the products are designed by targeted selection of materials, processes and packing.
This means that components can be reused and materials recycled when a product has reached the end of its useful life.

Optional accessories for VD4G-50 and VD4G-63 (Classic actuator)

Designation	Item No.	Rated supply voltage
Auxiliary switch (with clamp-type terminal)	-BGS1 -BGB1 -BGB2 -EGB3	
Auxiliary switch on locking magnet	-BGL1	
Auxiliary switch for fault signaling	-BGB4	
1st shunt release OFF	-MBO1	24 V ··· 240 V DC
2nd shunt release OFF	-MBO2	110 V ··· 240 V AC
Shunt release ON	-MBC	24 V ··· 240 V DC
Locking magnet	-RLE1	110 V ··· 240 V AC
Undervoltage release with spring mechanism	-MBU	24 V ··· 240 V DC
Delayed undervoltage release with spring mechanism	-MBU	see RNSU for supply voltage
Indirect overcurrent release with intermediate current transformer and spring mechanism	-MBO3	
Intermediate current transformer for indirect overcurrent release		
Magnet holder, complete (with integrated rectifiers -TB4, -TB1, -TB3, -TB2)		
Series rectifier	-TB6/-TB7	
Loading motor (with gearing)	-MAS	24 V ··· 240 V DC 110 V ··· 240 V AC
Push-on sleeve 4.8-2.5 for push-on blade 0.8 thick (for additional external connections)		

Spare parts for VD4G up to 50 kA and EL actuator

- Shunt opening release
- Additional shunt opening release
- Shunt closing release
- Geared motor for spring loading with electrical signaling of spring loaded
- Contact for signaling geared motor protection circuit breaker open/closed
- Contact for signaling closing spring loaded/ discharged
- Transient contact with momentary closing during circuit breaker opening
- Circuit breaker auxiliary contacts
- Locking electromagnet on operating mechanism
- Position contact of withdrawable truck
- Contacts for signaling connected/isolated
- Opening solenoid
- Isolating door interlock
- Locking electromagnet on withdrawable truck
- Set of six isolating contacts.

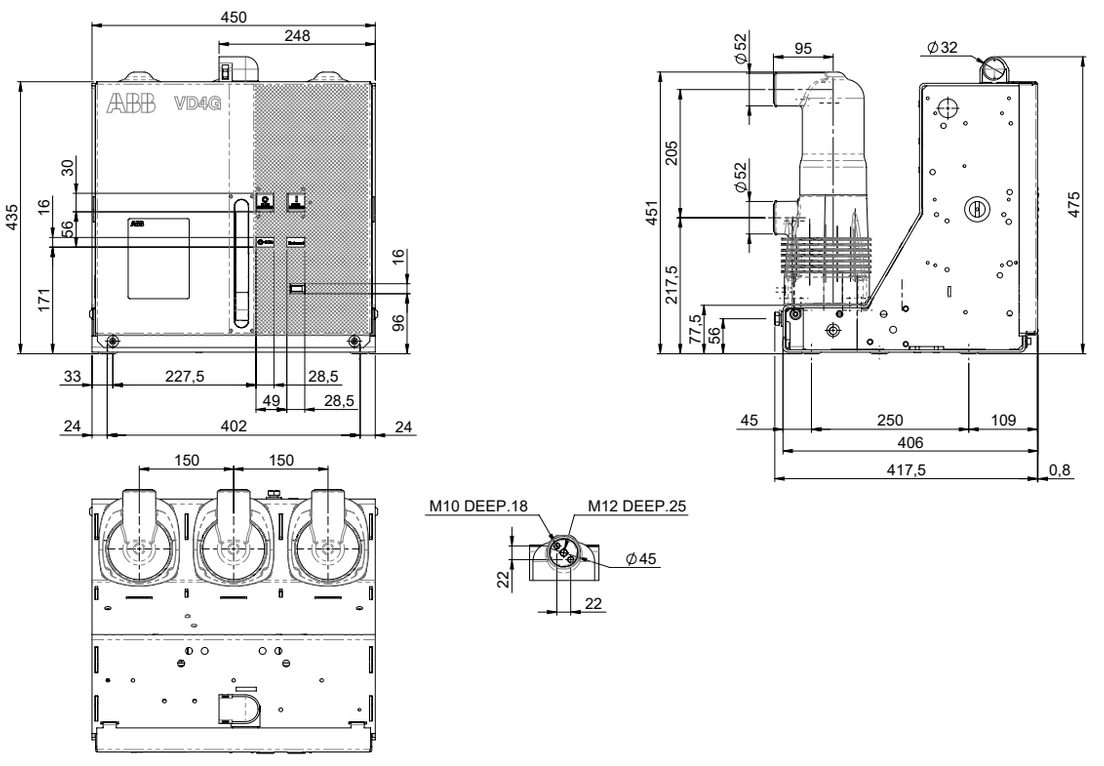
Ordering

Please contact our Service department and specify the circuit breaker serial number to order spare parts and check availability.

5. Overall dimensions

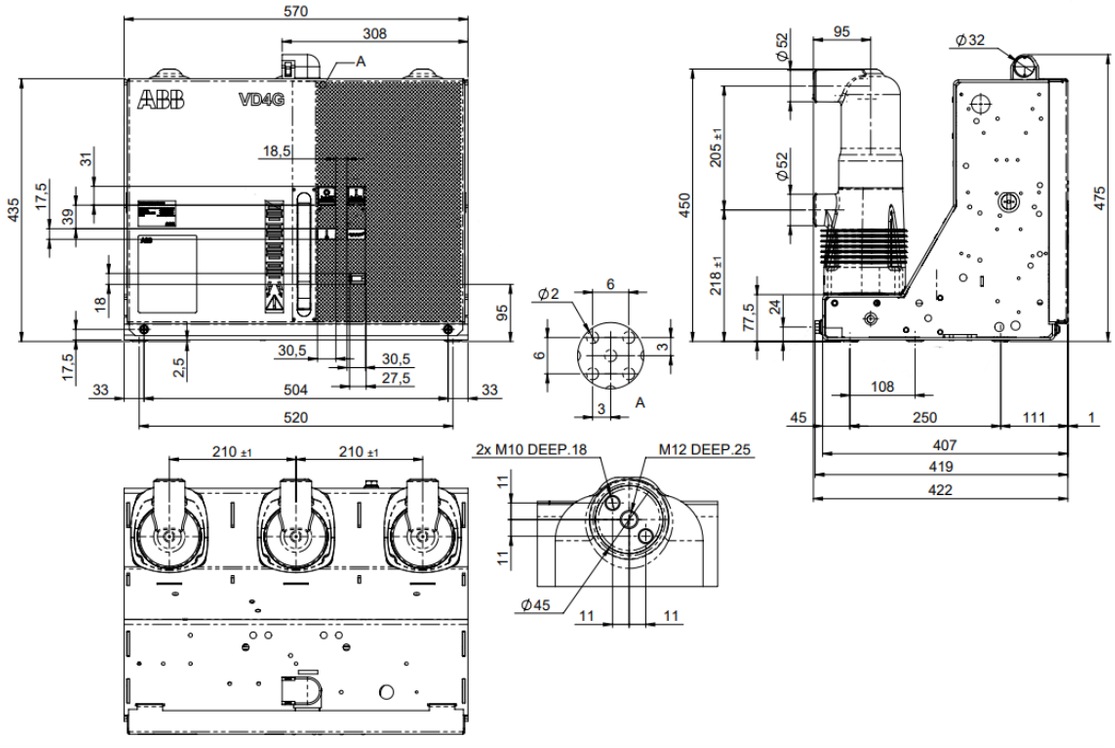
Fixed circuit breakers

VD4G-25	
TN	1VCD003891
Ur	15 kV
Ir	1250 A
Isc	31.5 kA



Fixed circuit breakers

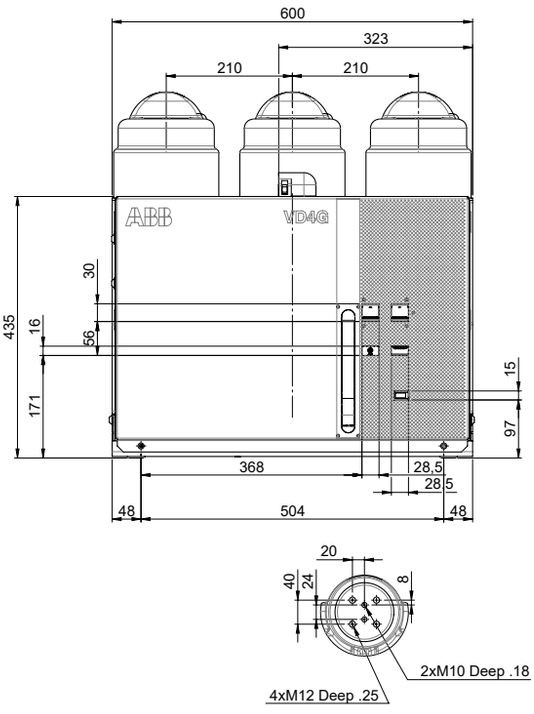
VD4G-25	
TN	2RDA046582
Ur	15 kV
Ir	1250 A
Isc	31.5 kA

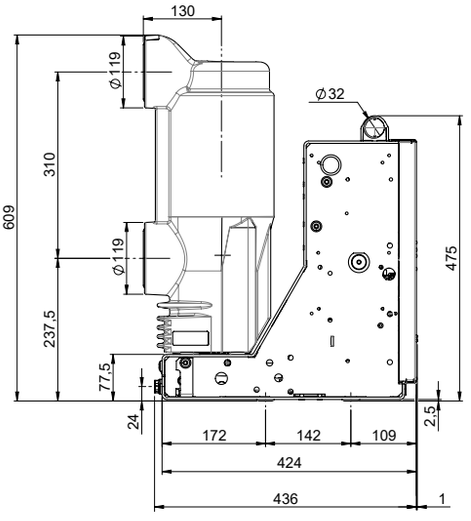


5. Overall dimensions

Fixed circuit breakers

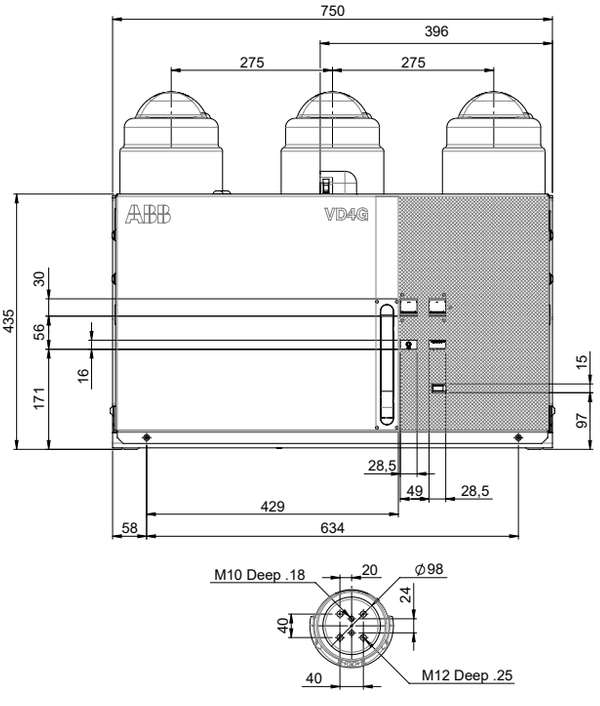
VD4G		
TN	1VCD000240	
Ur	15	kV
Ir	...2000	A
IscSFF	40	kA
IscGFF	25	(G2)
IscOOP	20	kA

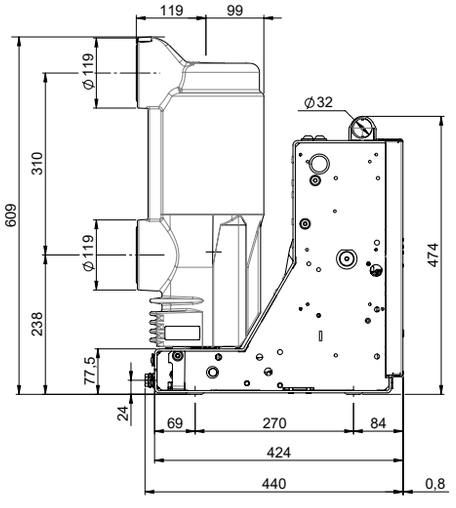




Fixed circuit breakers

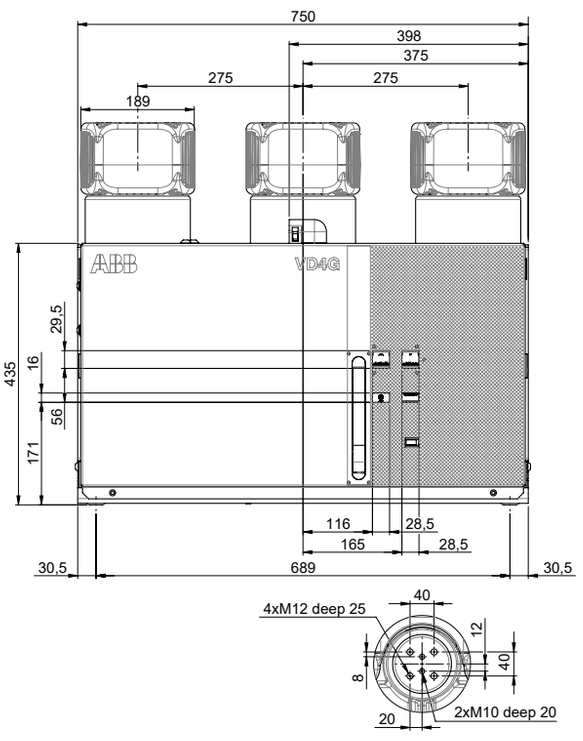
VD4G		
TN	1VCD000241	
Ur	15	kV
Ir	2000	A
IscSFF	40	kA
IscGFF	25	(G2)
IscOOP	20	kA

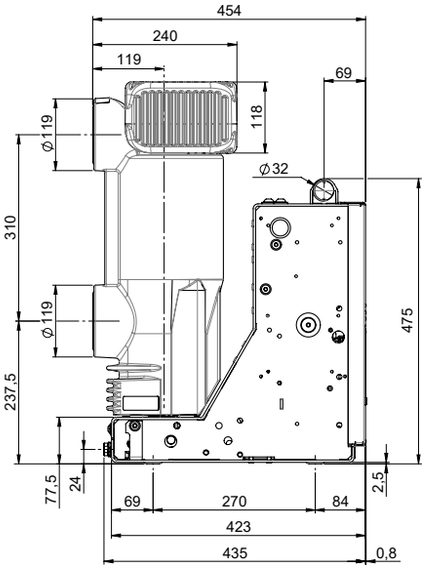




Fixed circuit breakers

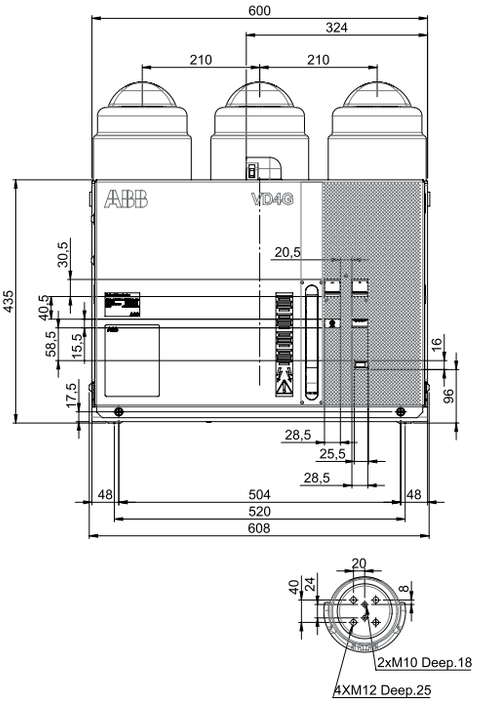
VD4G		
TN	1VCD000242	
Ur	15	kV
Ir	3150	A
IscSFF	40	kA
IscGFF	25	(G2)
IscOOP	20	kA

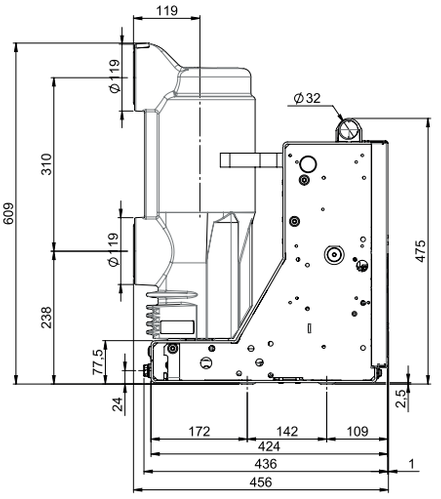




Fixed circuit breakers

VD4G-50/25		
TN	2RDA038045	
Ur	15	kV
Ir	1250	A
	2000	A
Isc	50	kA
	25	kA
	25	kA

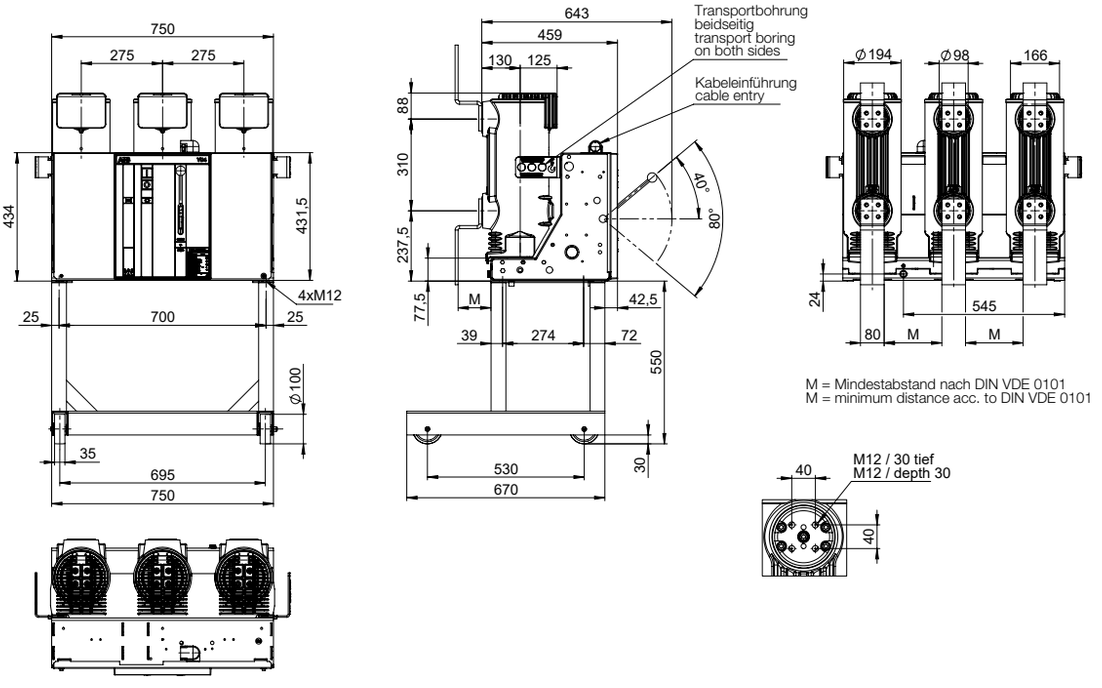




5. Overall dimensions

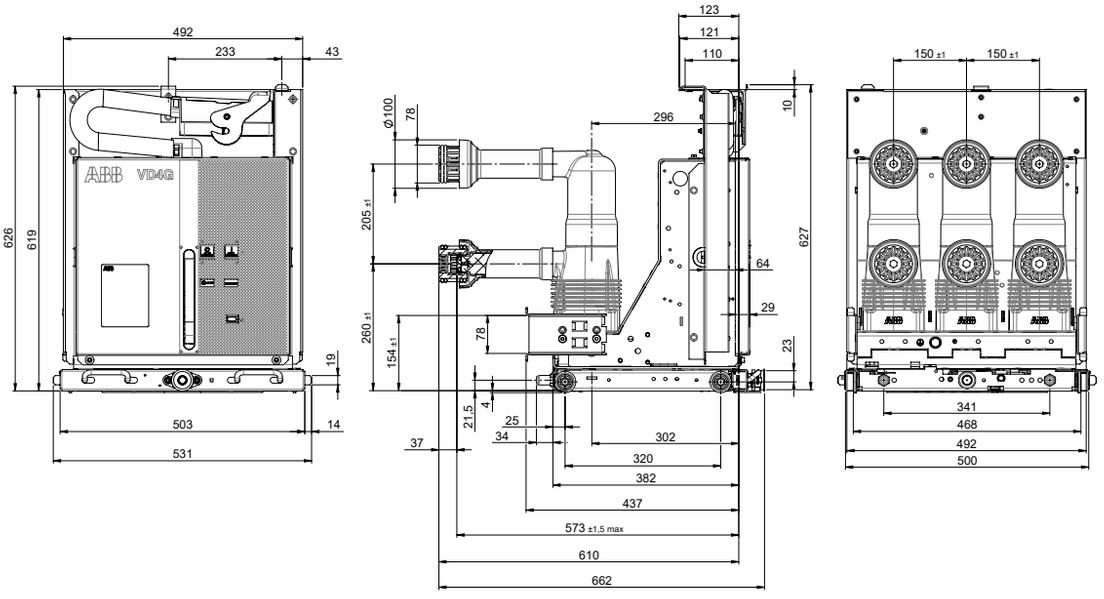
Fixed circuit breakers

VD4G		
TN	1VCD003935	
Ur	15	kV
Ir	3150	A
IscSFF	50-63	kA
IscGFF	50/37	(G2)
IscOOP	25	kA



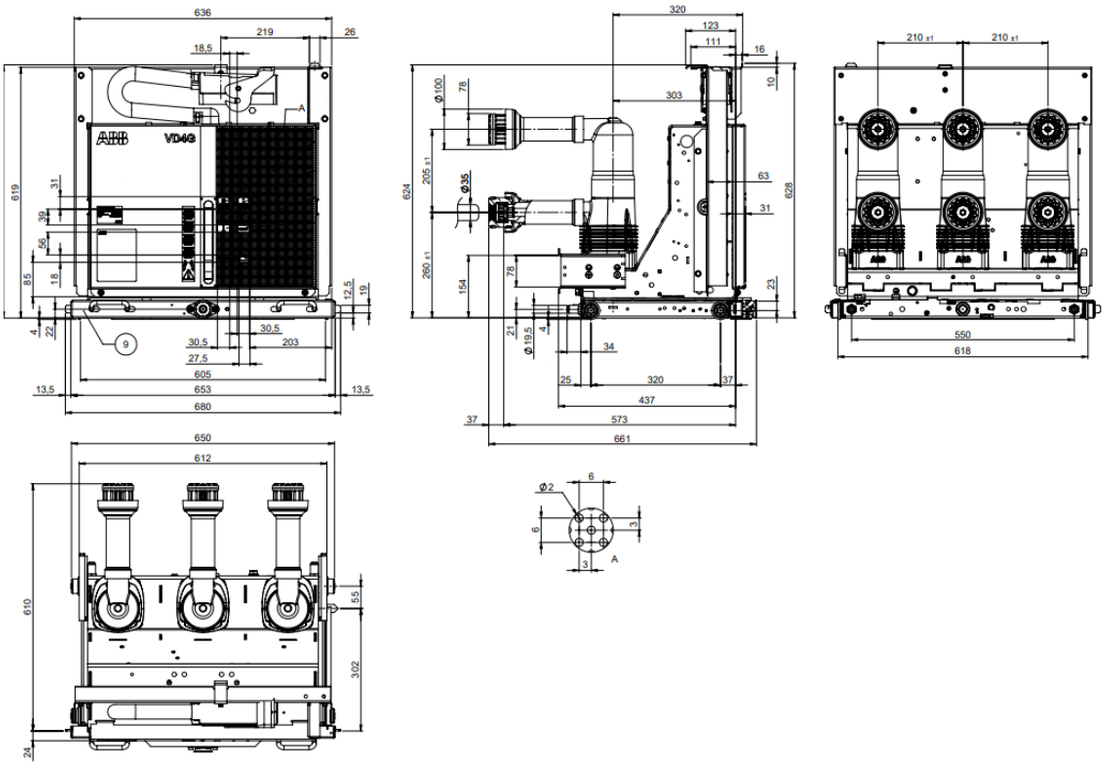
Withdrawable circuit breakers

VD4G		
TN	1VCD000233	
Ur	15	kV
Ir	1250	A
IscSFF	25	kA
IscGFF	16	(G2)
IscOOP	12.5	kA



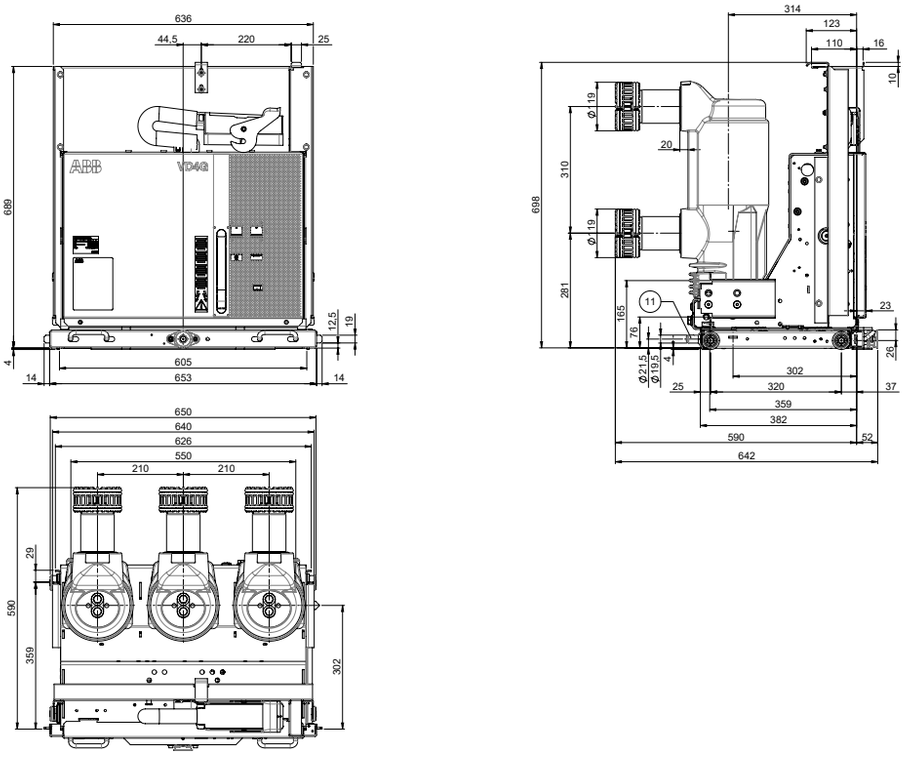
Withdrawable circuit breakers

VD4G/P-25		
TN	2RDA046589	
Ur	15	kV
Ir	1250	A
Isc	31.5	kA



Withdrawable circuit breakers

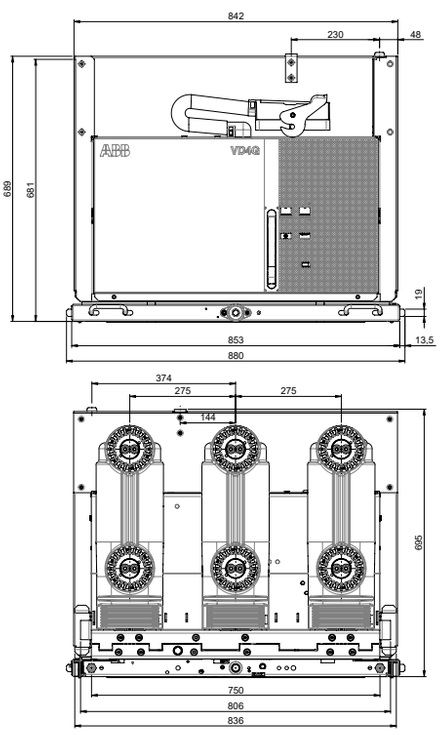
VD4G		
TN	1VCD000234	
Ur	15	kV
Ir	...2000	A
IscSFF	40	kA
IscGFF	25	(G2)
IscOOP	20	kA

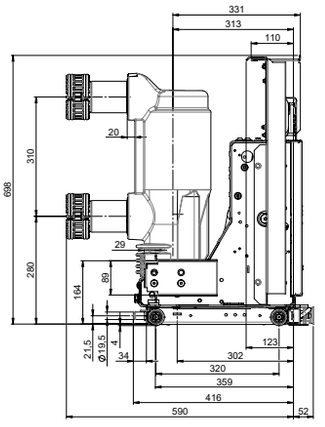


5. Overall dimensions

Withdrawable circuit breakers

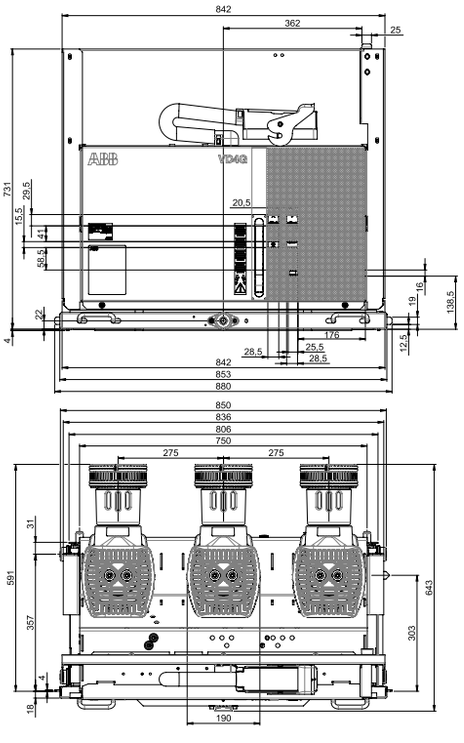
VD4G		
TN	1VCD000243	
Ur	15	kV
Ir	2000	A
IscSFF	40	kA
IscGFF	25	(G2)
IscOOP	20	kA

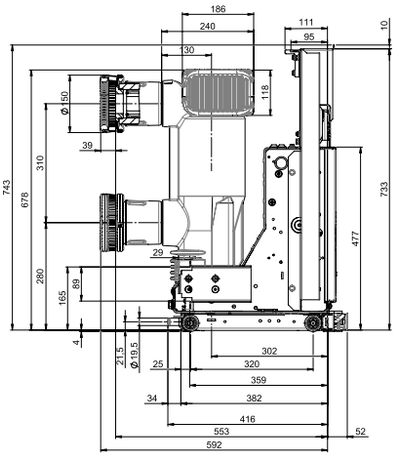




Withdrawable circuit breakers

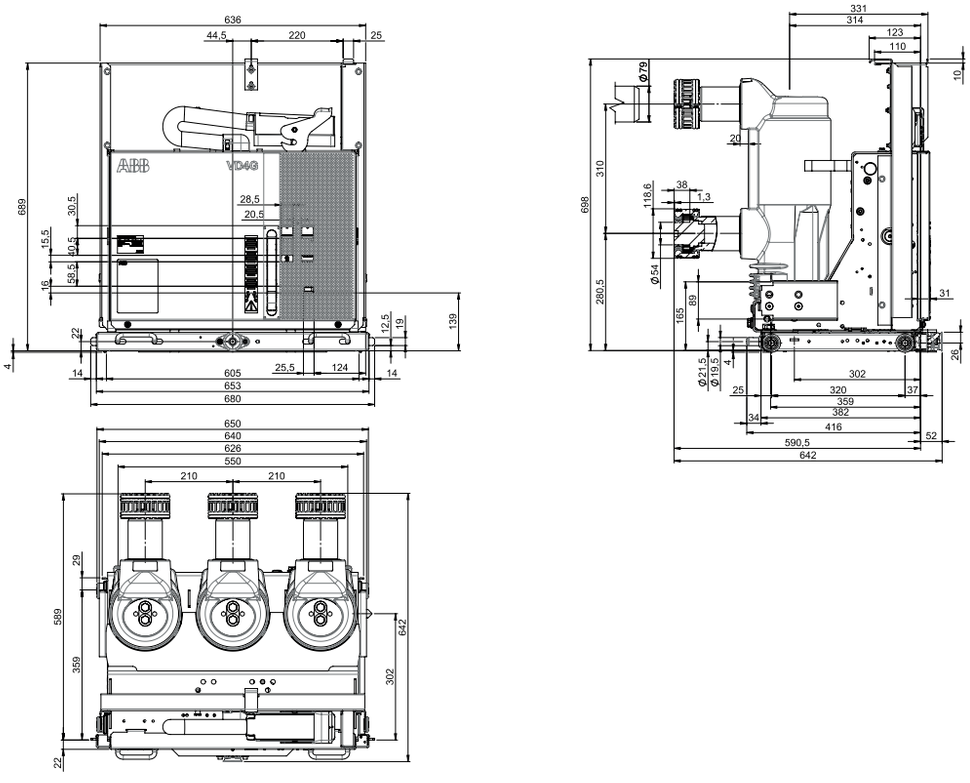
VD4G		
TN	1VCD000244	
Ur	15	kV
Ir	3150	A
IscSFF	40	kA
IscGFF	25	(G2)
IscOOP	20	kA





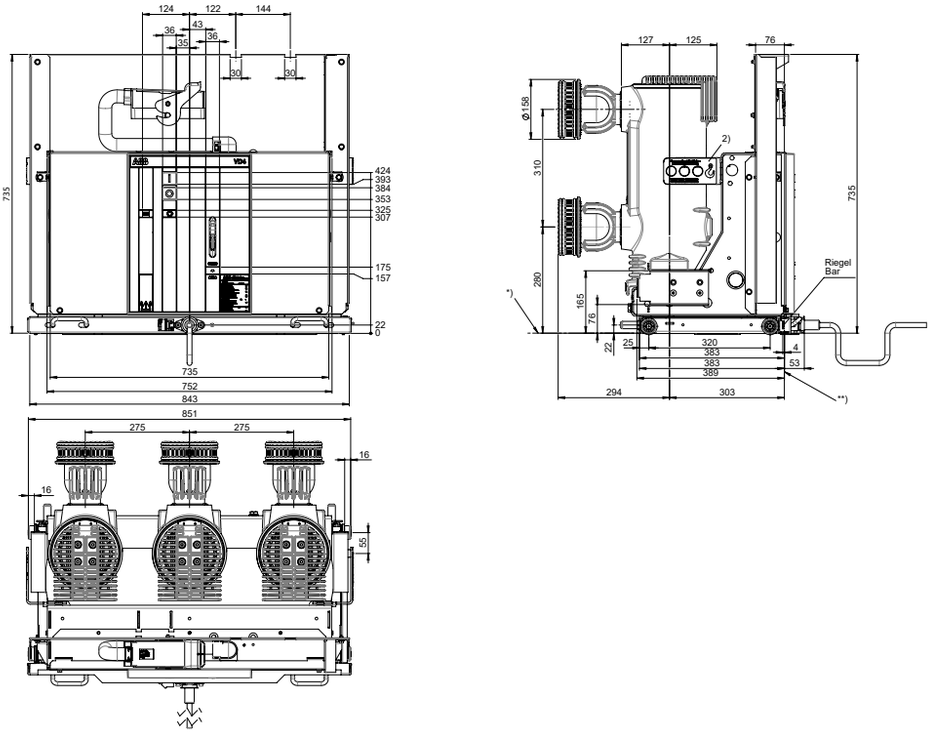
Withdrawable circuit breakers

VD4G/P-50/25		
TN	2RDA038051	
Ur	15	kV
Ir	1250	A
	1600	A
	2000	A
Isc	50	kA
	25	kA
	25	kA



Withdrawable circuit breakers

VD4G		
TN	1VBM700160	
Ur	15	kV
Ir	3150	A
IscSFF	50	kA
IscGFF	50/37	(G2)
IscOOP	25	kA



*) Rail
**) Front edge of bar
2) Remove the locking lugs on both sides before commissioning

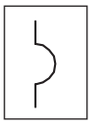
6. Electric circuit diagram

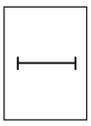
State of operation represented

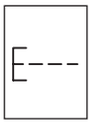
The diagrams illustrate the following conditions:
- Circuit breaker open and connected (only withdrawable circuit breaker)
- Circuits de-energized
- Closing springs discharged

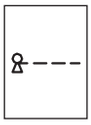
Graphical symbols for circuit diagrams

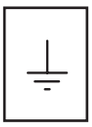

Thermal effect

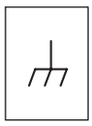

Electromagnetic effect

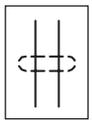

Timing

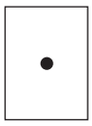

Push-button control

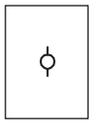

Key control

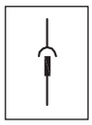

Earth (general symbol)

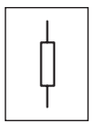

Mass, frame

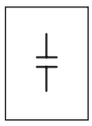

Conductors in shielded cable (two conductors shown)

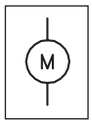

Connection of conductors


Terminal or clamp

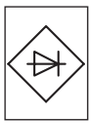

Socket and plug (female and male)

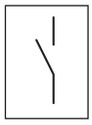

Resistor (general symbol)

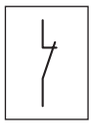

Capacitor (general symbol)

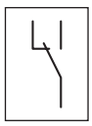


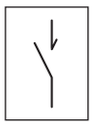
Motor (general symbol)

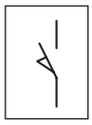

Rectifier with two half-waves (bridge)


Make contact


Break contact

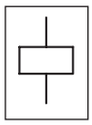

Change-over break before make contact

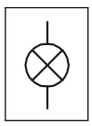

Passing make contact closing momentarily during release


Closing position contact (limit switch)


Opening position contact (limit switch)

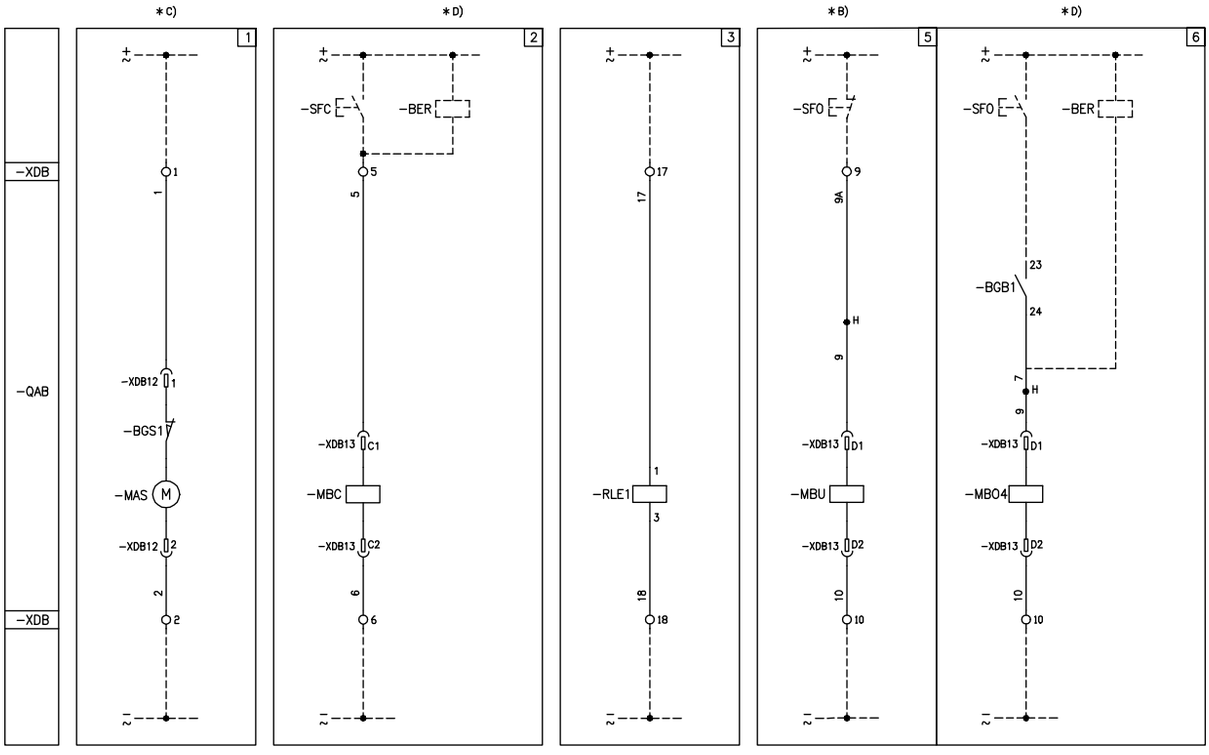

Power circuit breaker with automatic opening


Control coil (general symbol)

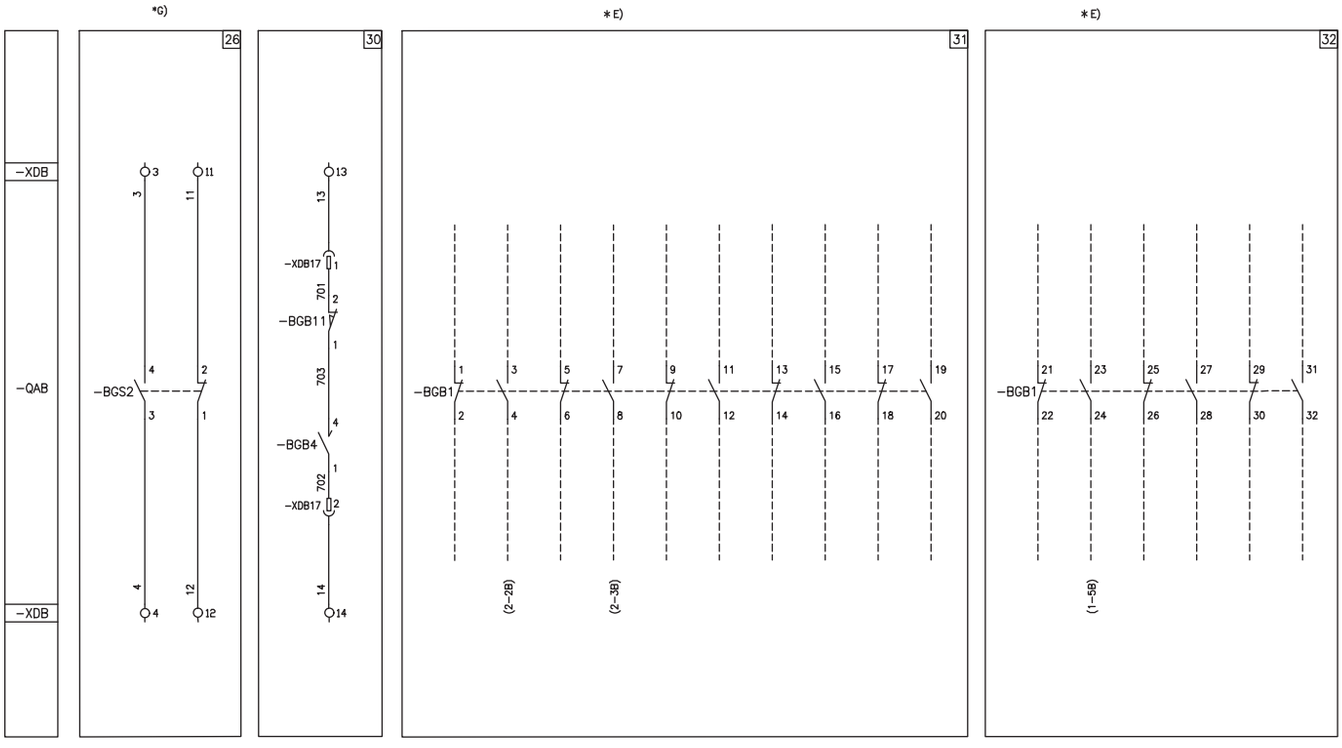

Lamp (general symbol)

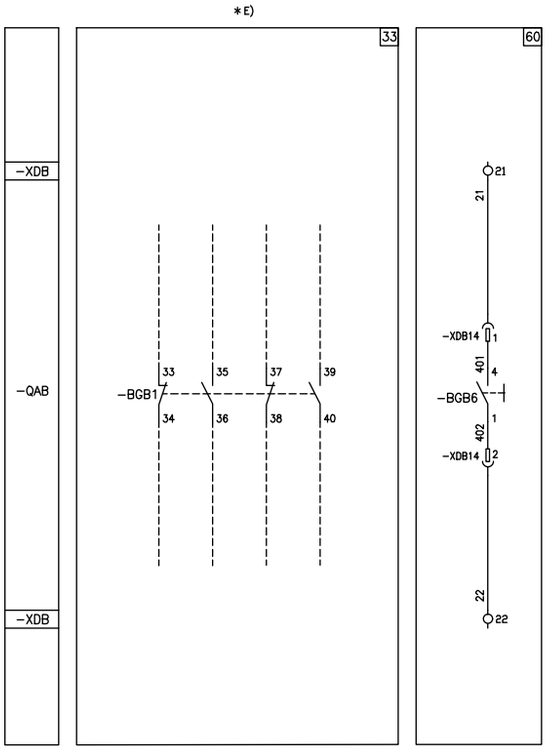
Circuit diagram 1VCD 400151 for 15 kV fixed circuit breakers up to 50/25 kA with EL actuator.

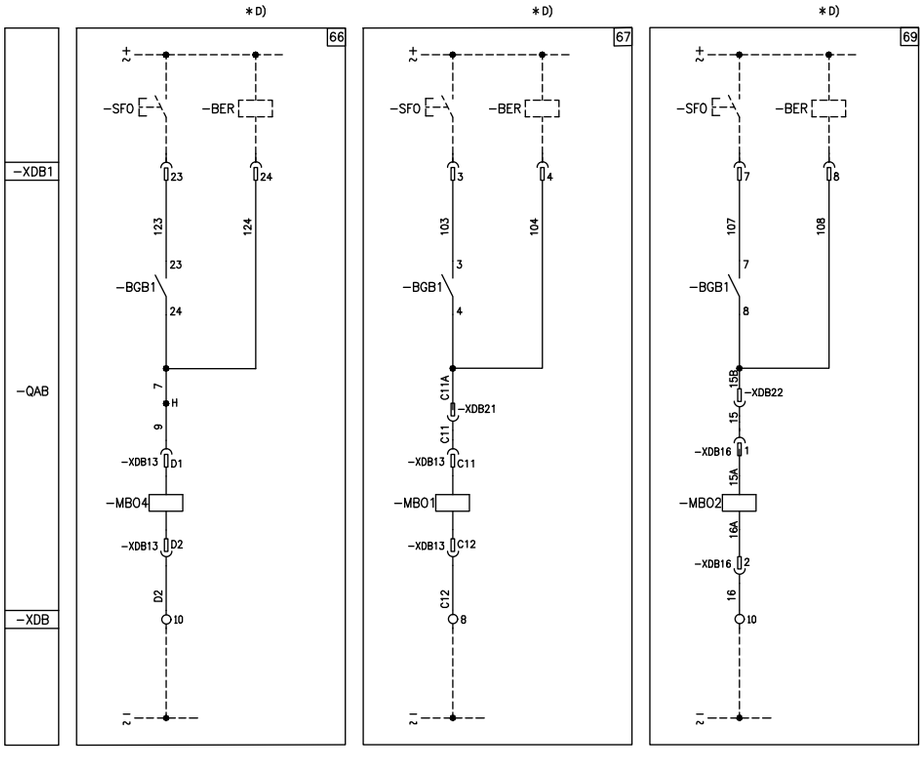
The circuit diagram shown in this section refers to fixed VD4G-25, VD4G-40 and VD4G-50/25 circuit breakers.

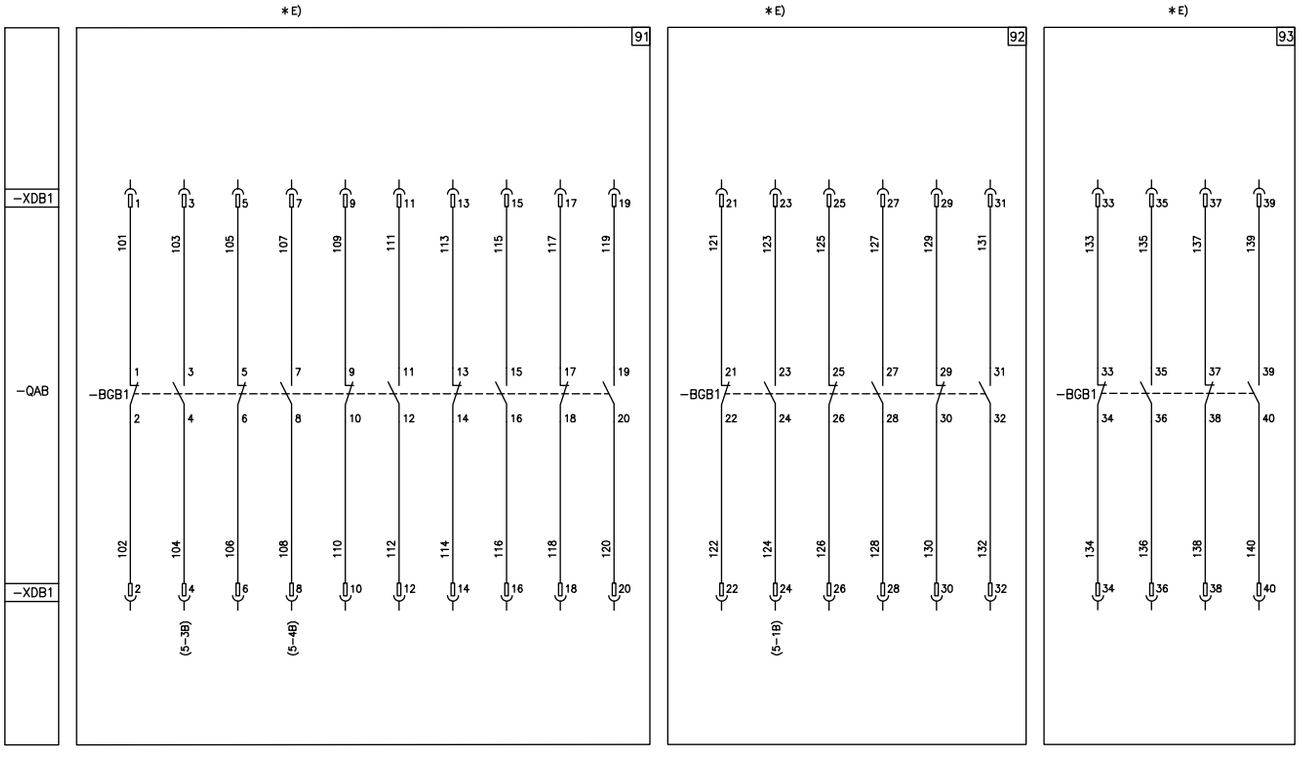


6. Electric circuit diagram






*D)
66
67
69
-XDB1
-QAB
-XDB
-SF0
-BER
-BGB1
-MBO4
-MBO1
-MBO2
-XDB13
-XDB16
-XDB21
-XDB22
H


*E)
91
92
93
-XDB1
-QAB
-BGB1
(5--3B)
(5--4B)
(5--1B)

6. Electric circuit diagram

Caption		
□	=	Figure number of the diagram.
*	=	See note indicated by the letter.
-BER	=	SOR Test Unit for monitoring continuity of shunt opening and closing release winding (see note D)
-BGB1	=	Auxiliary contacts of circuit breaker.
-BGB4	=	Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
-BGB6	=	Contact for electrical signaling of undervoltage release de-energized.
-BGB11	=	Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode.
-BGS1	=	Limit contact of spring loading motor.
-BGS2	=	Contact for signaling closing spring loaded-discharged.
-MAS	=	Motor for loading closing springs (see note C).
-MBC	=	Shunt closing release (see note D).
-MBO1	=	First shunt opening release (see note D).
-MBO2	=	Second shunt opening release (see note D).
-MBO3	=	Opening solenoid for release outside circuit breaker (see note F).
-MBO4	=	Third shunt opening release (see note D).
-MBU	=	Under-voltage release (see note B).
-QAB	=	Circuit breaker applications.
-RLE1	=	Locking magnet. Mechanically inhibits circuit breaker closing if de-energized.
		(Consumption can be limited by connecting a delayed operation enabling push-button in series).
-SFC	=	Push-button or contact for closing circuit breaker.
-SFO	=	Push-button or contact for opening circuit breaker.
-TB7	=	Rectifier for release -MBO3.
-XDB	=	Terminal box of circuit breaker circuits.
-XDB1	=	Connector of circuit breaker circuits.
-XDB10, ...,17	=	Connectors of applications.

Description of the figures		
Fig. 1	=	Circuit of motor for loading closing springs (see note C).
Fig. 2	=	Shunt closing release (anti-pumping is achieved mechanically), (see note D).
Fig. 3	=	Locking magnet. Mechanically inhibits circuit breaker closing if de-energized.
		Consumption can be limited by connecting a delayed operation enabling push-button in series.
Fig. 5	=	Instantaneous undervoltage release (see note B).
Fig. 6, 66	=	Circuit of third shunt opening release with possibility of continuous control of winding (see note D).
Fig. 7, 67	=	Circuit of first shunt opening release with possibility of continuous control of winding (see note D).
Fig. 9, 69	=	Circuit of second shunt opening release with possibility of continuous control of winding (see note D).
Fig. 10	=	Opening solenoid for release outside circuit breaker.
Fig. 11	=	Opening solenoid for release outside circuit breaker with AC supply.
Fig. 26	=	Electrical signaling of closing springs loaded and discharged.
Fig. 30	=	Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
Fig. 31, 91	=	Available auxiliary contacts of circuit breaker (see note E).
Fig. 32, 92	=	Available auxiliary contacts of circuit breaker (see note E).
Fig. 33, 93	=	Available auxiliary contacts of circuit breaker (see note E).
Fig. 60	=	Contact for electrical signaling of undervoltage release de-energized.

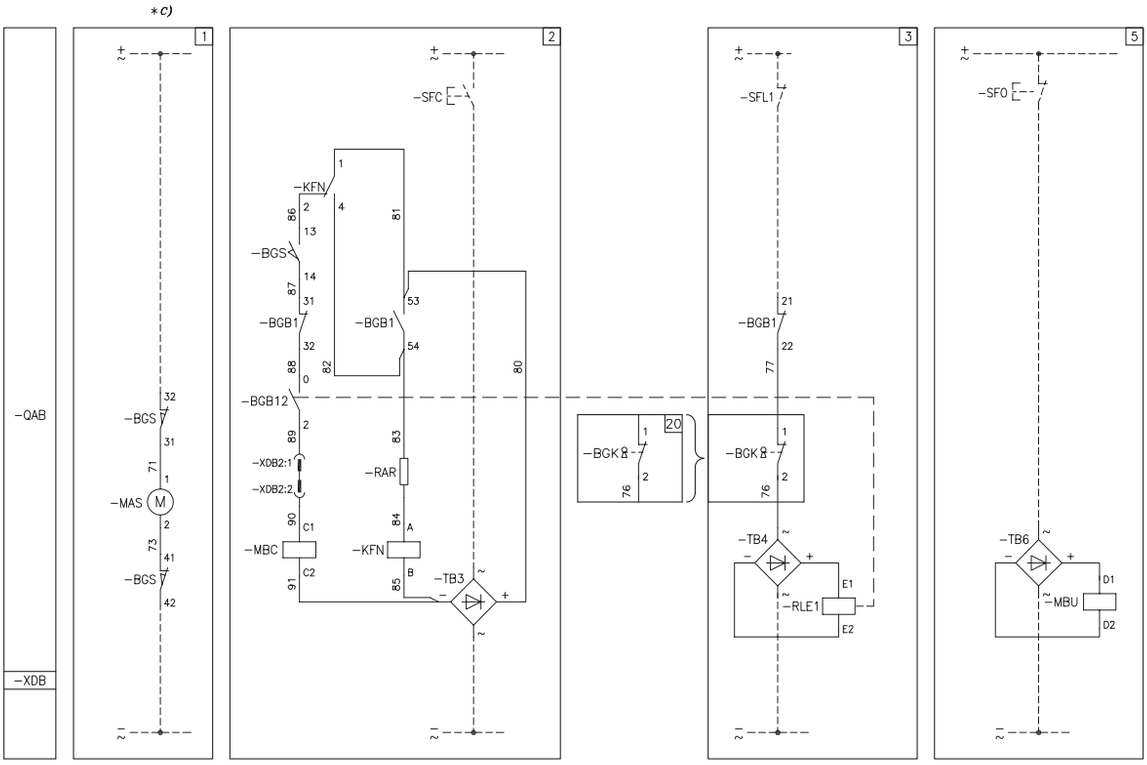
Incompatibility
The circuits indicated in the following figures cannot be supplied at the same time in the same circuit breaker:
5-6-66 | 7-67 | 9-69 | 31-91 | 32-92 | 33-93 | 10-11

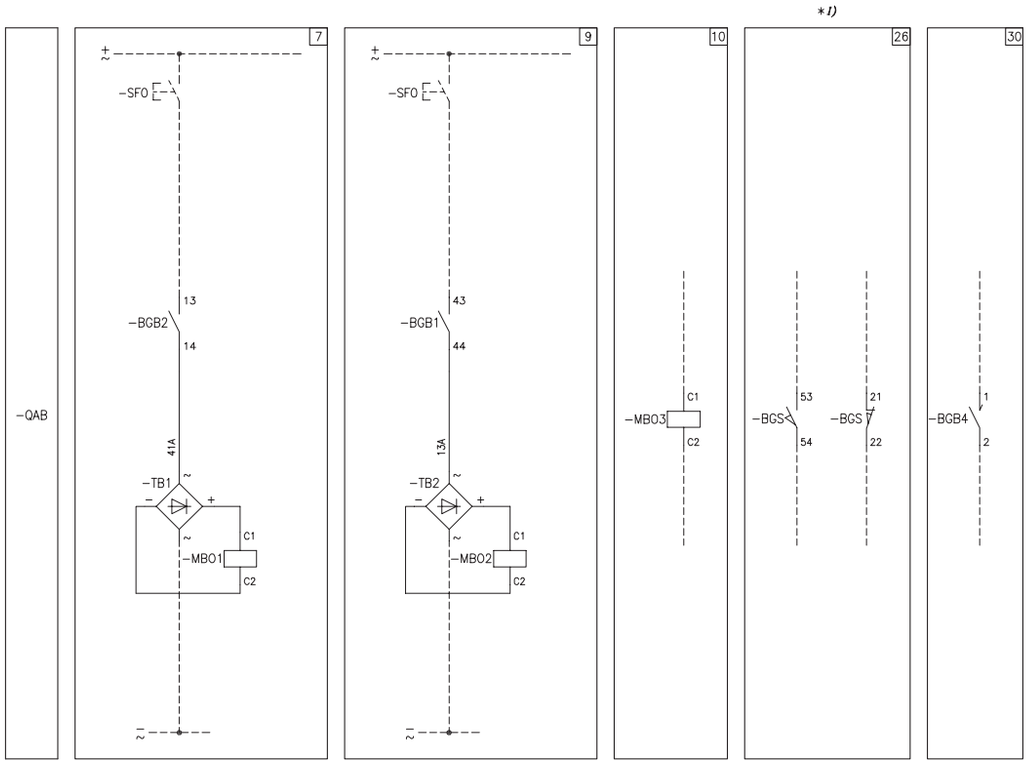
Notes	
A)	The circuit breaker is equipped solely with the applications specified in the order confirmation. Consult this catalog for information about how to make out an order.
B)	The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit breaker or from an independent source. Circuit breaker closing is only enabled when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and under-voltage releases and the circuit breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the under-voltage release's enabling instant and energizing of the shunt closing release. Incompatible with -MBO4.
C)	Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be operated at the same time. To prevent excessive power draw, the springs must be loaded by hand before the auxiliary circuit is powered.
D)	The circuit for monitoring the continuity of the release windings must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases. -MBO4 incompatible with -MBU. -MBO4 not available for VD4 50 kA.
E)	When fig. 6 is required, contact -BGB1 (23-24) of fig.32 is not available. When fig. 7 is required, contact -BGB1 (3-4) of fig. 31 is not available. When fig. 9 is required, contact -BGB1 (7-8) of fig. 31 is not available. When fig. 32 is required, it is obligatory to supply the auxiliary contacts of fig. 31. When fig. 33 is required, it is obligatory to supply the auxiliary contacts of fig. 32. When fig. 66 is required, contact -BGB1 (23-24) of fig. 92 is not available. When fig. 67 is required, contact -BGB1 (3-4) of fig. 91 is not available. When fig. 69 is required, contact -BGB1 (7-8) of fig. 91 is not available. When fig. 92 is required, it is obligatory to supply the auxiliary contacts of fig. 91. When fig. 93 is required, it is obligatory to supply the auxiliary contacts of fig. 92. Figs. 33 and 93 are not available for VD4 50 kA.
F)	Figs. 10 and 11 are only available for VD4 up to 31.5 kA.
G)	The energizing voltage must be the same for both signals.

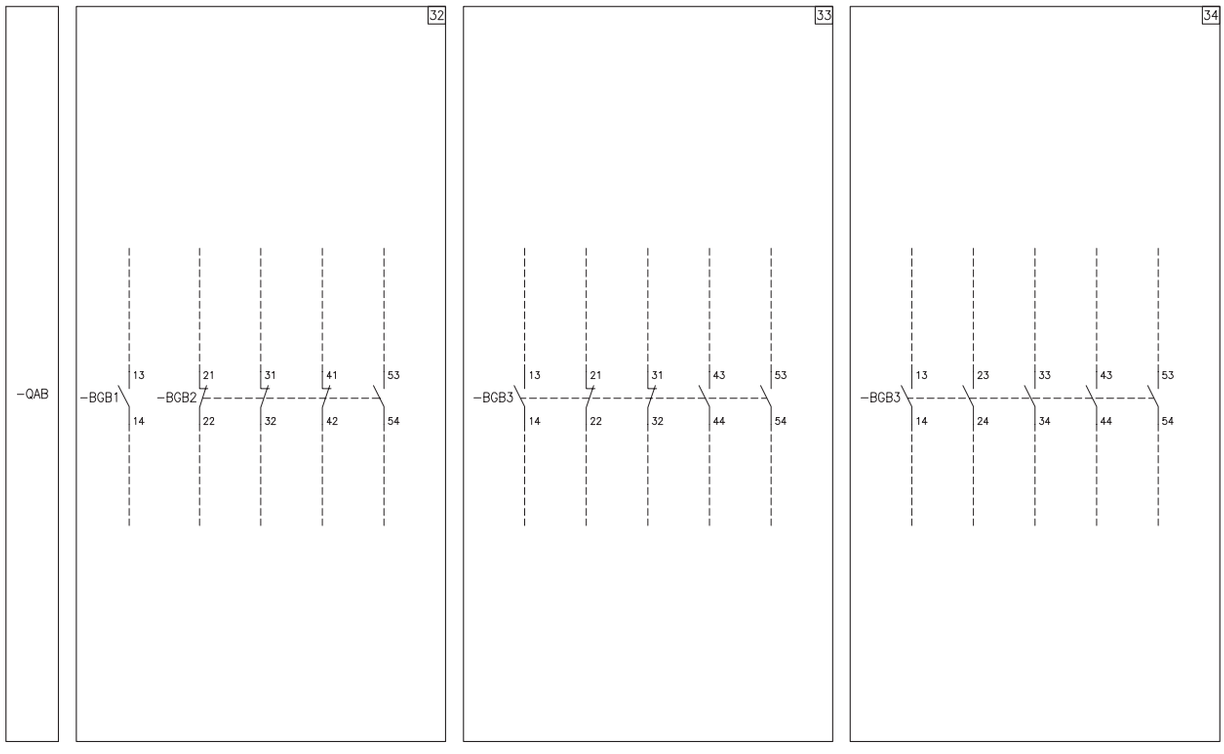
6. Electric circuit diagram

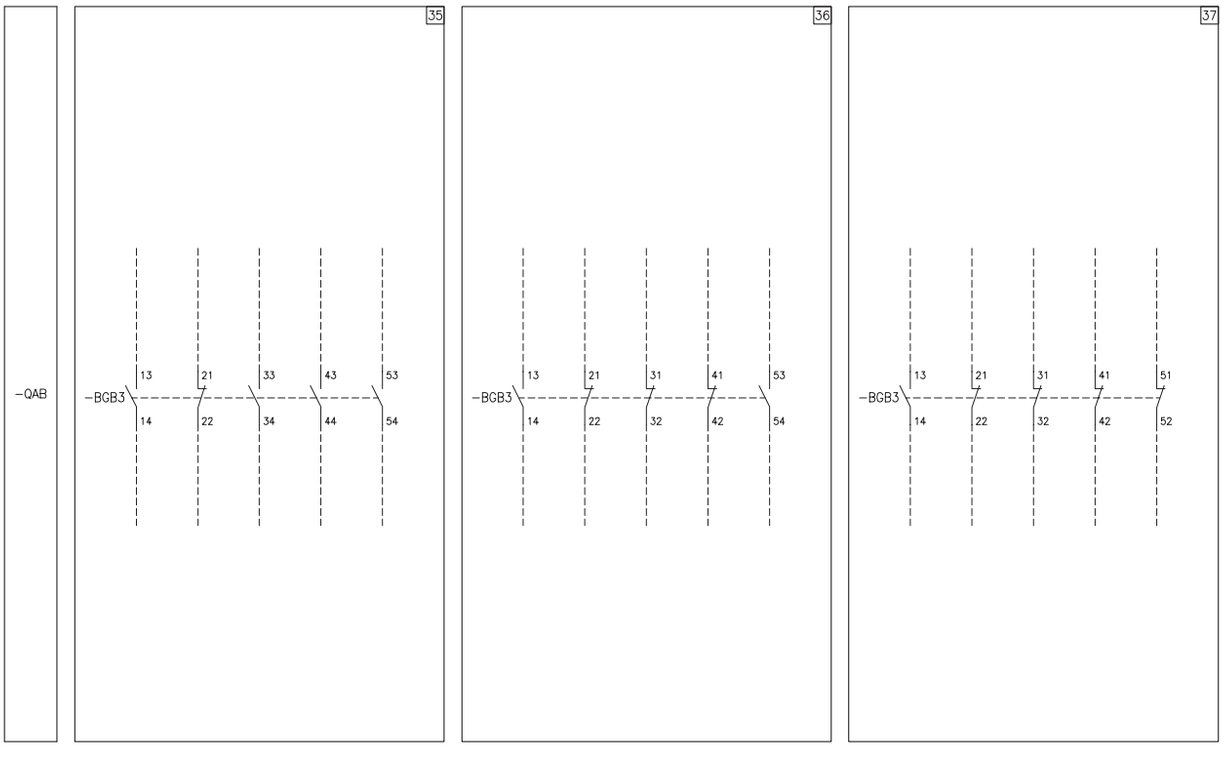
Circuit diagram 1VCD 400 230 for 15 kV fixed circuit breakers at 50/50 kA and 63 kA with Classic actuator.

The circuit diagram shown in this section refers to fixed VD4G-50/50 and VD4G-63 circuit breakers.

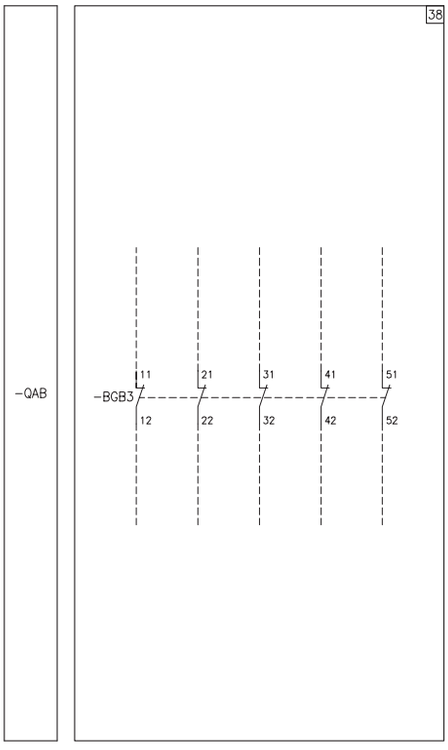





-QAB
32
-BGB1
13
14
-BGB2
21
22
31
32
41
42
53
54
33
-BGB3
13
14
21
22
31
32
43
44
53
54
34
-BGB3
13
14
23
24
33
34
43
44
53
54


-QAB
35
-BGB3
13
14
21
22
33
34
43
44
53
54
36
-BGB3
13
14
21
22
31
32
41
42
53
54
37
-BGB3
13
14
21
22
31
32
41
42
51
52

6. Electric circuit diagram



Reference designation of objects in electrical documents
(In compliance with standard IEC 81346-2 and ABB technical standard 2NBA000001)

Caption		
☐	=	Reference number of diagram figure
*	=	See note indicated by the letter
-BGB1 ,..., -BGB3	=	Circuit breaker auxiliary contacts
-BGB4	=	Auxiliary passing contact (closing momentarily when circuit breaker opens)
-BGB12	=	Auxiliary contact for block closing of the circuit breaker
-BGK	=	Contact operated by the key lock preventing the circuit breaker closing
-BGS	=	Limit switch signalling closing springs charged or discharged
-MAS	=	Motor for the closing charging springs (see note C)
-MBC	=	Shunt closing release
-MBO1	=	First shunt opening release (see note E)
-MBO2	=	Second shunt opening release (see note E)
-MBO3	=	Indirect overcurrent relay
-MBU	=	Instantaneous undervoltage release
-KFN	=	Antipumping relay
-QAB	=	Main circuit breaker
-RAR	=	Resistor
-RLE1	=	Locking magnet. If de-energized it prevents the circuit breaker closing
-SFC	=	Pushbutton or contact for the circuit breaker closing
-SFO	=	Pushbutton or contact for the circuit breaker opening
-SFL1	=	Contact locking the circuit breaker closing
-TB1	=	Rectifier for -MO1
-TB2	=	Rectifier for -MO2
-TBJ	=	Rectifier for -MBC and -KFN
-TB4	=	Rectifier for -RLE1
-TB6	=	Rectifier for -MBU
-XDB2	=	Connectors of the accessories

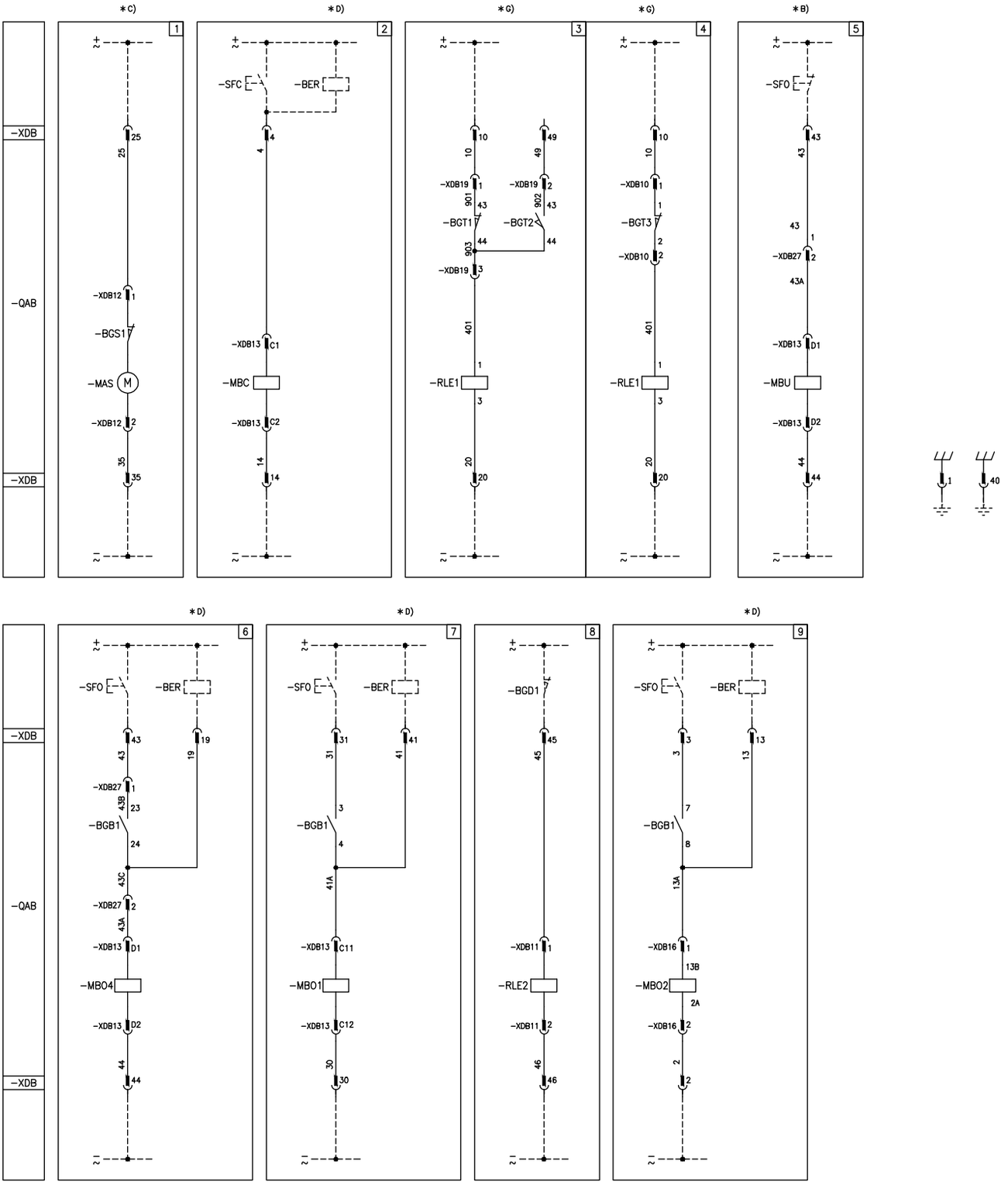
Diagram figures description		
Fig. 1	=	Springs charging-motor circuit (see note C)
Fig. 2	=	Shunt closing release
Fig. 3	=	Locking magnet on the operating mechanism. If de-energized it prevents the circuit breaker closing
Fig. 5	=	Instantaneous undervoltoge release
Fig. 7	=	First shunt opening release circuit
Fig. 9	=	Second shunt opening release circuit
Fig. 10	=	Indirect overcurrent relay
Fig. 20	=	Contact operated by the key lock preventing the circuit breaker closing
Fig. 26	=	Contact signalling charged or discharged closing springs (see note I)
Fig. 30	=	Wiping contact 35 ms for circuit breaker tripped indication
Fig. 32	=	Circuit breaker available auxiliary contacts
Fig. 33,..., 38	=	Circuit breaker available auxiliary contacts

Incompatibility
The combination of circuits given in the figures below are not possible supplied on the same circuit breaker:
33 - 34 - 35 - 36 - 37 - 38

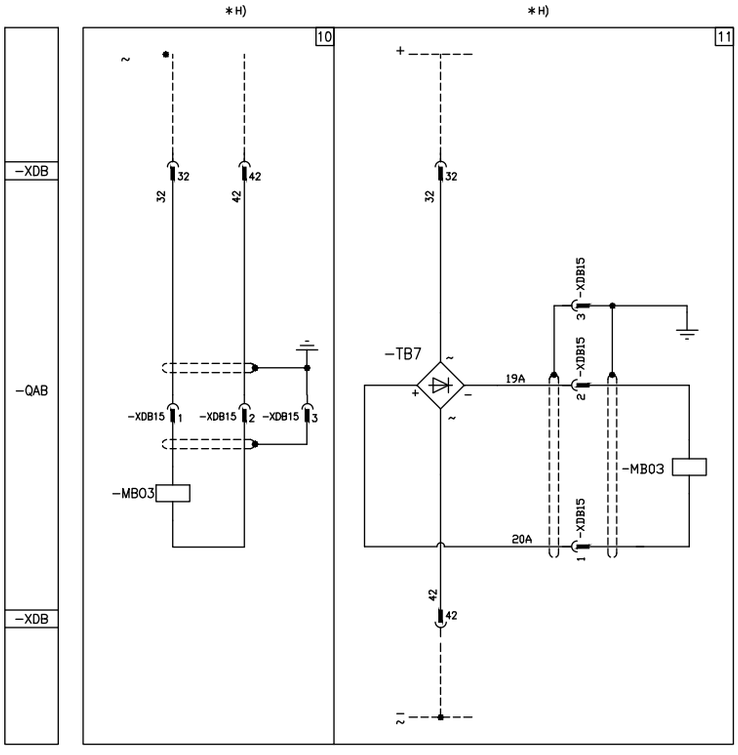
Notes	
A)	The circuit-breaker is delivered complete with the accessories listed in the order aknowledgement only. To draw up the order examine the apparatus catalogue.
C)	Check the power supply available on the auxiliary circuit to verify if it is adeguate to start several closing spring-charging motors simultaneously. To prevent excessive consumption the closing springs must be charged manually before energizing the auxiliary circuit.
I)	Both limit switches signalling must be working ot the same supply voltage.

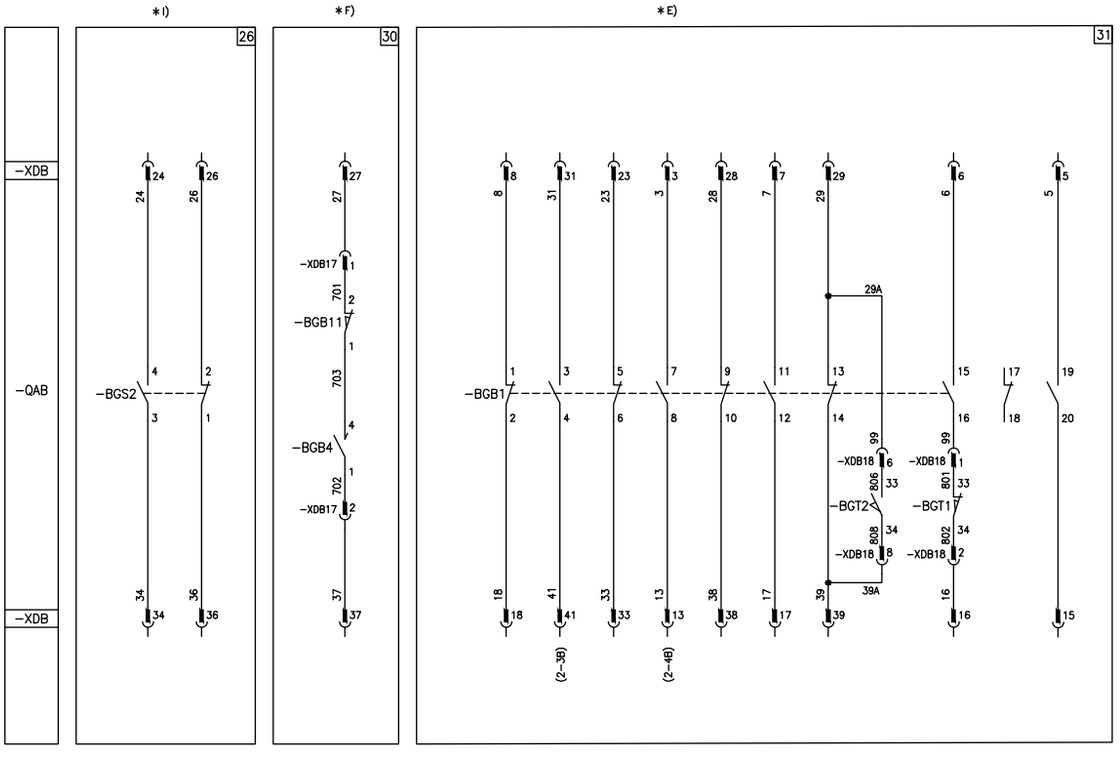
Circuit diagram 1VCD 400 155 for 15 kV withdrawable circuit breakers for UniGear switchgear up to 50/25 kA with EL actuator.

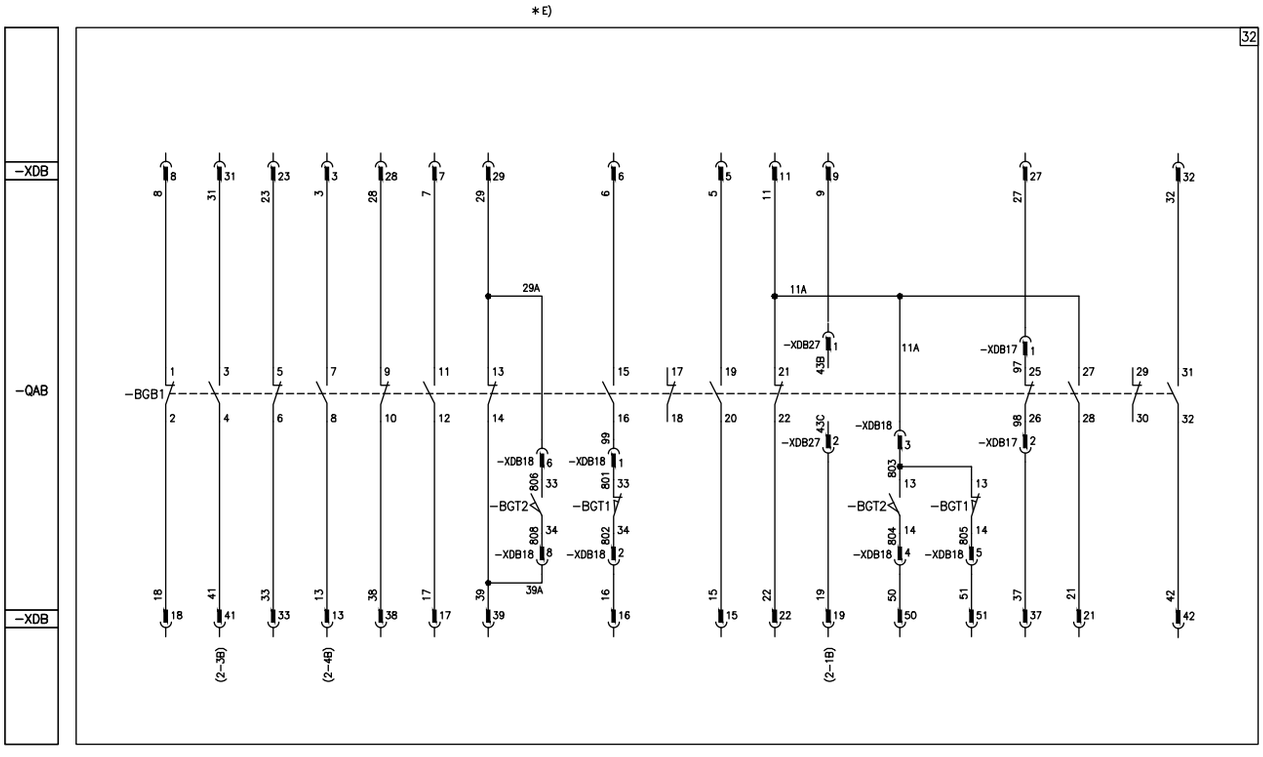
The circuit diagram shown in this section refers to withdrawable circuit breakers VD4G/P-25, VD4G/P-40 and VD4G/P-50/25 for UniGear switchgear. See diagram 1VCD 400156 for withdrawable circuit breakers with motor-operated truck.

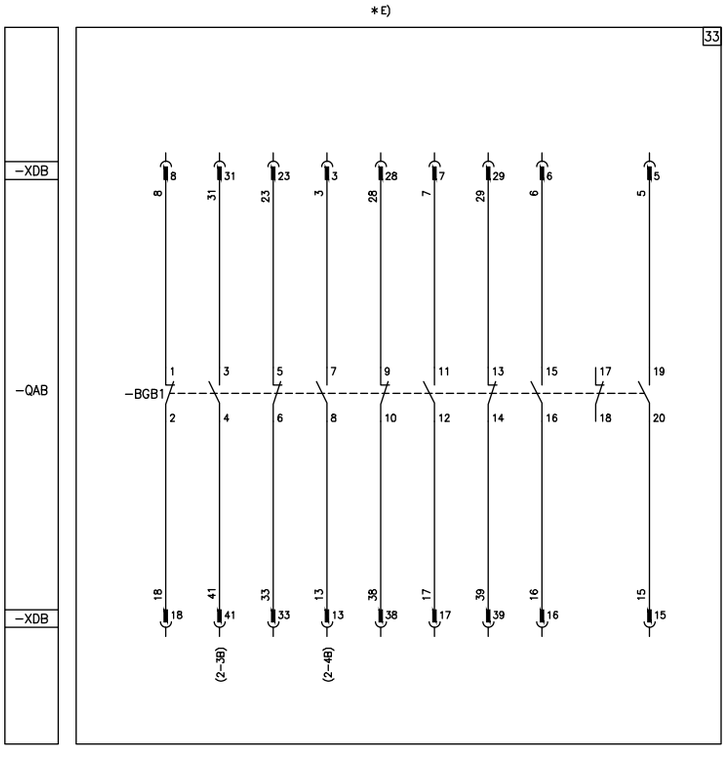


6. Electric circuit diagram

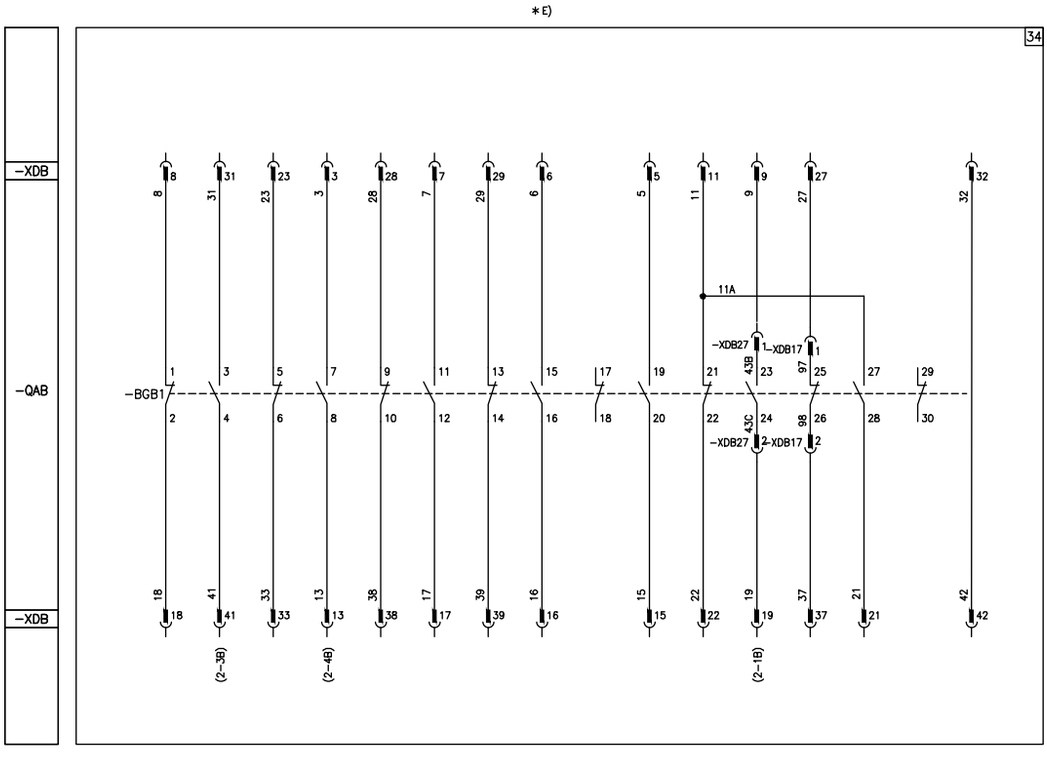


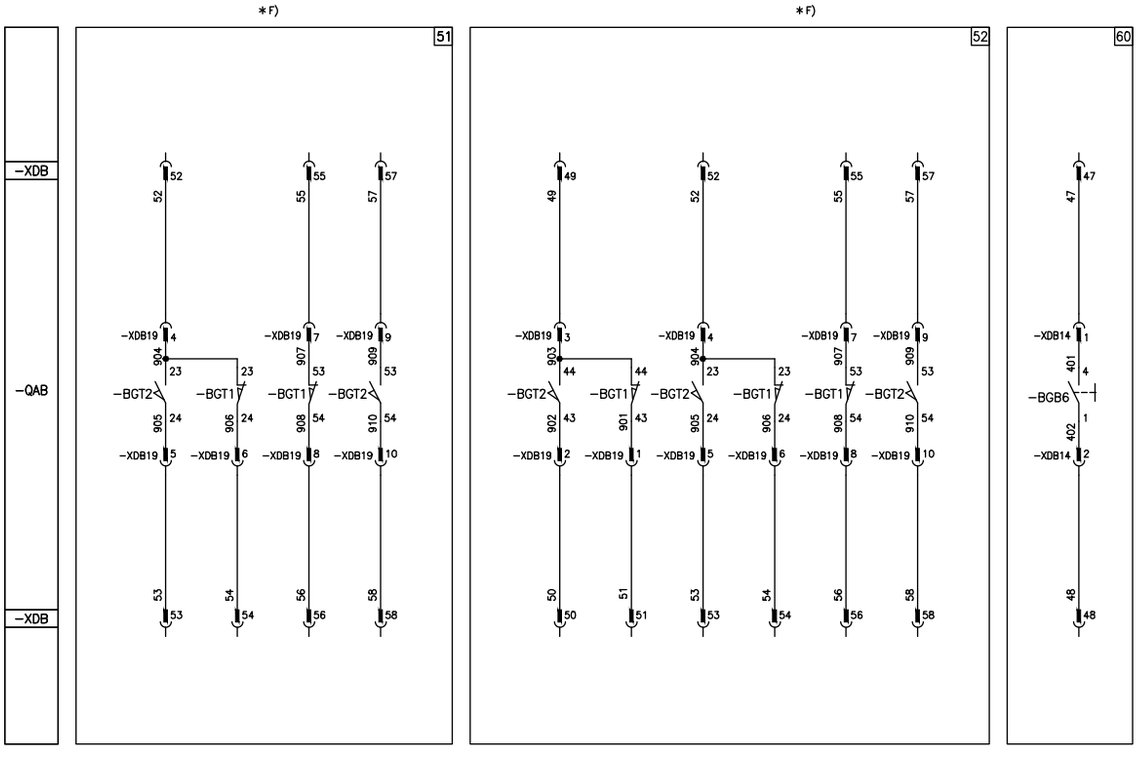



*E)
32
-XDB
-QAB
-XDB
-BGB1
-XDB18
-XDB27
-XDB17
-BGT2
-BGT1
29A
11A
39A
43B
43C
(2-3B)
(2-4B)
(2-1B)


*E)
33
-XDB
-QAB
-XDB
-BGB1
(2-3B)
(2-4B)

6. Electric circuit diagram





Caption		
□	=	Figure number of the diagram.
*	=	See note indicated by the letter.
-BER	=	SOR Test Unit for monitoring continuity of shunt opening and closing release winding (see note D)
-BGB1	=	Auxiliary contacts of circuit breaker.
-BGB4	=	Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
-BGB6	=	Contact for electrical signaling of undervoltage release de-energized.
-BGB11	=	Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode.
-BGD1	=	Enclosure door position contact.
-BGS1	=	Limit contact of spring loading motor.
-BGS2	=	Contact for signaling closing springs loaded-discharged.
-BGT1	=	Electrical signaling contacts for circuit breaker in racked-in position (see note F)
-BGT2	=	Electrical signaling contacts for circuit breaker in isolated position (see note F)
-BGT3	=	Circuit breaker position contact, open during isolating travel.
-MAS	=	Motor for loading closing springs (see note C).
-MBC	=	Shunt closing release (see note D).
-MBO1	=	First shunt opening release (see note D).
-MBO2	=	Second shunt opening release (see note D).
-MBO3	=	Opening solenoid for release outside circuit breaker.
-MBO4	=	Third shunt opening release (see note D).
-MBU	=	Under-voltage release (see note B).
-QAB	=	Circuit breaker applications.
-RLE1	=	Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (Consumption can be limited by connecting a delayed push-button in series so as to enable the operation).
-RLE2	=	Locking magnet (on truck). Mechanically inhibits circuit breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed push-button in series so as to enable the operation).
-SFC	=	Push-button or contact for closin circuit breaker
-SFO	=	Push-button or contact for closing circuit breaker.
-TB7	=	Rectifier for release -MBO3.
-XDB	=	Terminal box of circuit breaker circuits.
-XDB10, ... , 27	=	Connectors of applications
-XDB28	=	Connector of applications.

Description of the figures		
Fig. 1	=	Circuit of motor for loading closing springs (see note C).
Fig. 2	=	Shunt closing release (anti-pumping is achieved mechanically). (see note D).
Fig. 3	=	Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (If -RL1 is required, provide this figure when fig.31 or 32 are selected). Consumption can be limited by connecting a delayed push-button in series so as to enable the operation.
Fig. 4	=	Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (If -RL1 is required, provide this figure when fig.33 or 34 are selected). Consumption can be limited by connecting a delayed push-button in series so as to enable the operation.
Fig. 5	=	Instantaneous undervoltage release (see note B).
Fig. 6	=	Circuit of third opening release with continuous control of winding (see note D).
Fig. 7	=	Circuit of first opening release with continuous control of winding (see note D).
Fig. 8	=	Locking magnet (on truck). Mechanically inhibits circuit breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed push-button in series so as to enable the operation).
Fig. 9	=	Circuit of second opening release with continuous control of winding (see note D).
Fig. 10	=	Opening solenoid for release outside circuit breaker.
Fig. 11	=	Opening solenoid for release outside circuit breaker with AC supply.
Fig. 26	=	Electrical signaling of closing springs loaded and discharged.
Fig. 30	=	Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
Fig. 31, ... , 34	=	Available auxiliary contacts of circuit breaker (see note E).
Fig. 51	=	Contacts for electrical signaling of circuit breaker in racked-in and isolated positions located on circuit breaker truck (obligatory when fig. 31 or 32 are required).
Fig. 52	=	Contacts for electrical signaling of circuit breaker in racked-in and isolated positions located on circuit breaker truck (supplied on request when fig. 33 or 34 are required).
Fig. 60	=	Contact for electrical signaling of undervoltage release de-energized.

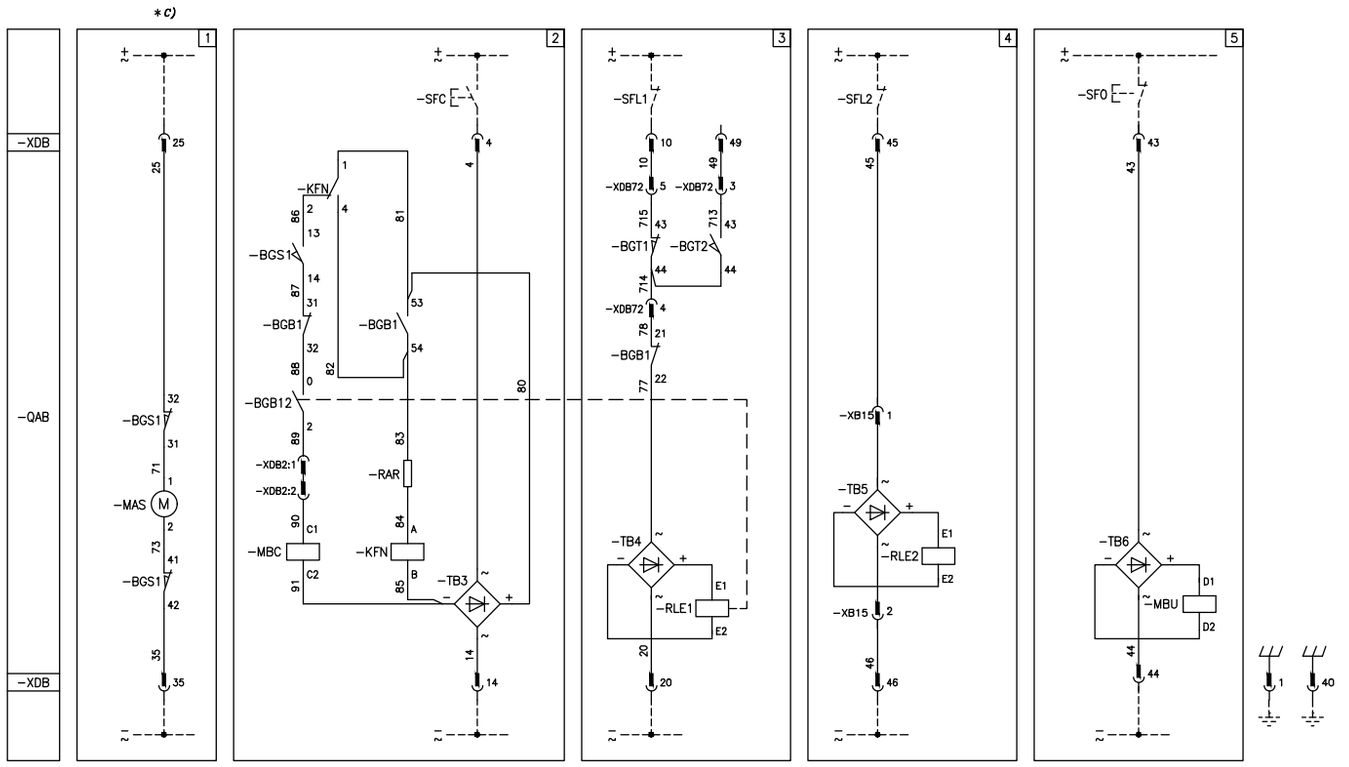
6. Electric circuit diagram

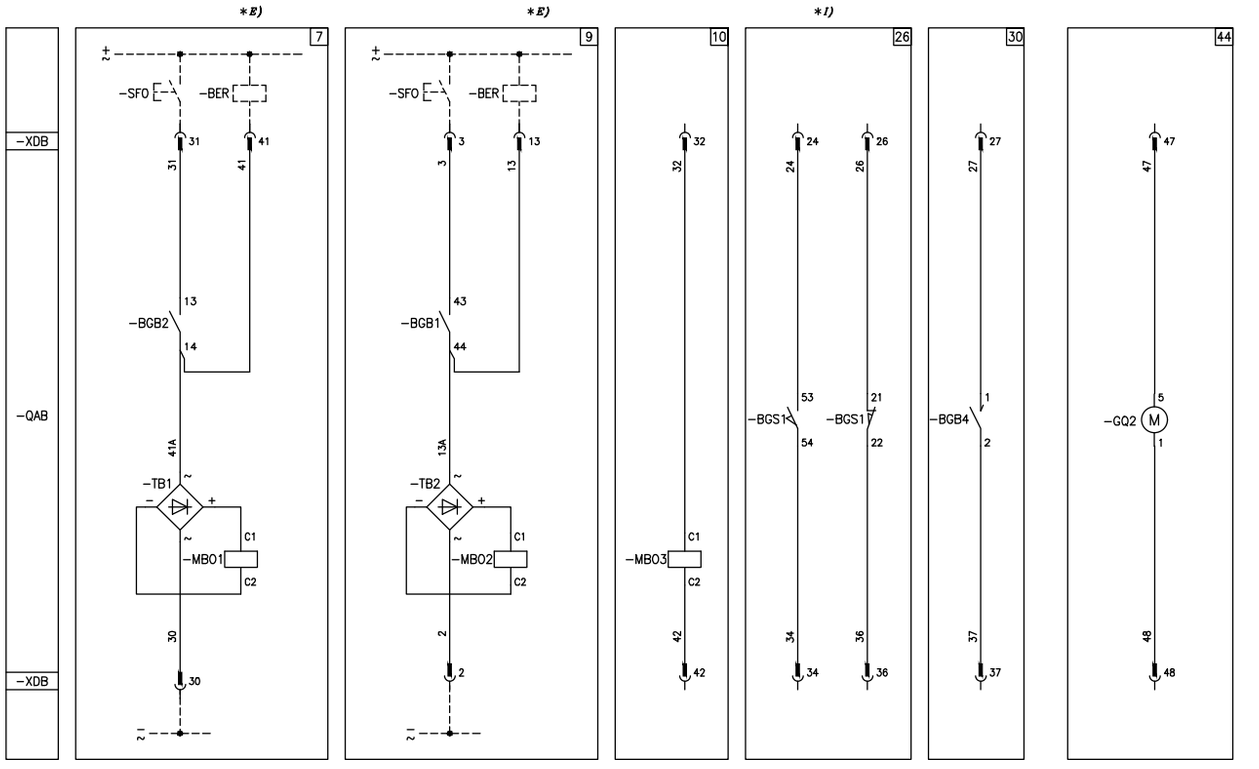
Incompatibility
The circuits indicated in the following figures cannot be supplied at the same time in the same circuit breaker:
3-4 | 3-33-34 | 4-31-32 | 5-6 | 10-11 | 31-32-33-34 | 31-32-52 | 33-34-51 | 51-52

Notes	
A)	Circuit breaker is equipped solely with the applications specified in the order confirmation. Consult this catalog for information about how to make out an order.
B)	The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit breaker or from an independent source. Circuit breaker closing is only enabled when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and under-voltage releases and the circuit breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the under-voltage release's enabling instant and energizing of the shunt closing release. Incompatible with -MBO4.
C)	Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be operated at the same time. To prevent excessive power draw, the springs must be loaded by hand before auxiliary circuit is powered.
D)	The circuit for monitoring the continuity of the release windings must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases: -MBO4 incompatible with -MBU. -MBO4 not available on Vmax and VD4 50kA.
E)	When fig. 6 is required, contact -BGB1 (23-24) of fig. 32-34 is not available. When fig. 7 is required, contact -BGB1 (3-4) of fig. 31-32-33-34 is not available. When fig. 9 is required, contact -BGB1 (7-8) of fig. 31-32-33-34 is not available. When fig. 10 or 11 are required, contact -BGB1 (31-32) of fig. 32 and 34 is not available. When fig. 30 is required, contact -BGB1 (25-26) of fig. 32 and 34 is not available.
F)	The contacts for electrical signaling of circuit breaker in isolated and racked-in position (-BGT1 and BGT2) shown in fig. 51-52 are installed on circuit breaker truck (movable part).
G)	Fig. 3 is supplied when fig. 31 or 32 are required. Fig. 4 is supplied when fig. 33 or 34 are required (in this case, it is obligatory to supply –BGT3).
H)	Fig. 10 is only available for VD4 up to 31.5 kA and Vmax. Fig. 11 is only available for VD4 up to 31.5 kA.
I)	The energizing voltage must be the same for both signals.

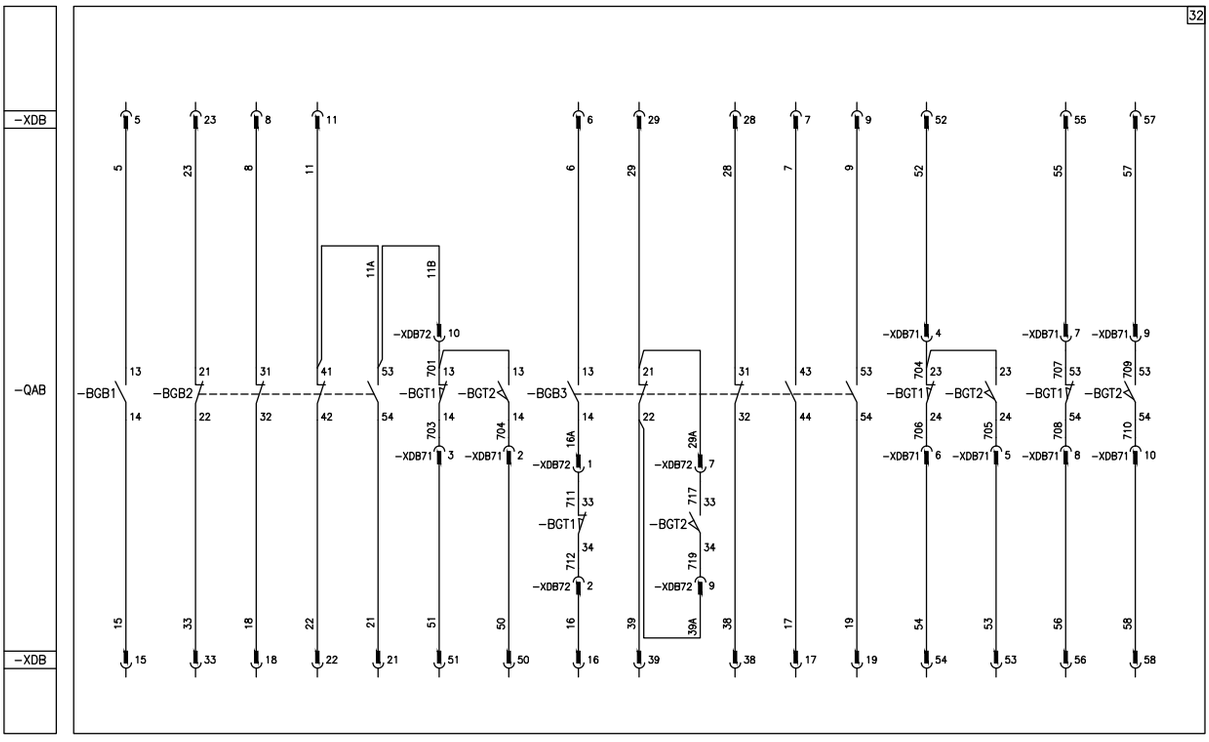
Circuit diagram 1VCD 400 231 for 15 kV withdrawable circuit breakers for UniGear switchgear at 50/50 kA and 63 kA with Classic actuator.

The circuit diagram shown in this section refers to withdrawable circuit breakers VD4G/P-50/50 and VD4G/P-63 for circuit breakers.





6. Electric circuit diagram



Reference designation of objects in electrical documents
(In compliance with standard IEC 81346-2 and ABB technical standard 2NBA000001)

□	=	Reference number of diagram figure
*	=	See note indicated by the letter
-BER	=	Device for the supervision of shunt opening release coil continuity (see note E)
-BGB1,... -BGB3	=	Circuit breaker auxiliary contacts
-BGB4		Auxiliary passing contact (closing momentarily when circuit breaker opens)
-BGB12	=	Auxiliary contact for block closing of the circuit breaker
-BGS	=	Limit switch signalling closing springs charged or discharged
-BGT1	=	Contacts signalling circuit breaker in the connected position
-BGT2	=	Contacts signalling circuit breaker in the isolated position
-MAS	=	Motor for the closing charging springs (see note C)
-MBC	=	Shunt closing release
-MBO1	=	First shunt opening release (see note E)
-MBO2	=	Second shunt opening release (see note E)
-MBO3	=	Indirect overcurrent relay
-MBU	=	Instantaneous undervoltage release
-KFN	=	Antipumping relay
-QAB	=	Main circuit breaker
- RAR	=	Resistor
-RLE1	=	Locking magnet. If de-energized it prevents the c. breaker closing
-RLE2	=	Locking magnet on the truck. If de-energized it prevents the circuit breaker racking-in and racking-out mechanically
-SFC	=	Pushbutton or contact for the circuit breaker closing
-SFO	=	Pushbutton or contact for the circuit breaker opening
-SFL1		Contact locking the circuit breaker closing
-SFL2		Contact locking the circuit breaker racking-in and racking-out
-TB1		Rectifier for -MO1
-TB2		Rectifier for -MO2
-TB3		Rectifier for -MBC and -KFN
-TB4		Rectifier for -RLE1
-TB6	=	Rectifier for -MBU
-GQ2		Ventilator
-XDB	=	Connector for the circuit breaker circuits
-XDB2	=	Connector of the accessories
-XDB71, -XDB72	=	Connectors of the accessories

Diagram figures description		
Fig. 1	=	Springs charging-motor circuit (see note C)
Fig. 2	=	Shunt closing release
Fig. 3	=	Locking magnet on the operating mechanism. If de-energized it prevents the circuit breaker closing
Fig. 4	=	Locking magnet on the truck. If de-energized it prevents the circuit breaker racking-in and racking-out mechanically
Fig. 5	=	Instantaneous undervoltage release
Fig. 7	=	First shunt opening release circuit with possibility of permanent supervision of coil continuity (see note E)
Fig. 9	=	Second shunt opening release circuit with possibility of permanent supervision of coil continuity (see note E)
Fig. 10	=	Indirect overcurrent relay
Fig. 26	=	Contact signalling charged or discharged closing springs (see note I)
Fig. 30	=	Wiping contact 35 ms for circuit breaker tripped indication
Fig. 32	=	Circuit breaker available auxiliary contacts
Fig. 44	=	Ventilation circuit

Notes	
A)	The circuit breaker is delivered complete with the accessories listed in the order aknowledgement only. To draw up the order examine the apparatus catalogue.
C)	Check the power supply available on the auxiliary circuit to verify if it is adeguate to start several closing spring-charging motors simultaneously. To prevent excessive consumption the closing springs must be charged manually before energizing the auxiliary circuit.
E)	The circuit for the supervision of shunt opening release coil continuity shall be used for this function only.
I)	Both limit switches signalling must be working at the same supply voltage

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1VCP000671 - Rev.E, en - Technical catalog - 2024.03 (VD4G) (gs)

VÝROBEK VYSOKÉHO NAPĚTÍ

TJC 4

Transformátory napětí pro vnitřní prostředí

Parametry	Hodnota
Nejvyšší napětí pro zařízení	3.6 - 12 kV
Zkušební napětí průmyslového kmitočtu / 1 min.	10 - 42 kV
Zkušební napětí při atmosférickém impulzu	40 - 75 kV
Max. jmenovitá zátěž; třídy	25/0.2 - 75/0.5 - 150/1 VA/cl
Pomocné vinutí	50 - 200/6P VA/cl

Popis
Jednopólově izolované transformátory napětí TJC 4 jsou zalévané do epoxidové pryskyřice a jsou navrhovány většinou pro izolační napětí 3,6 kV až 12 kV.

Pokud není požadována jiná hodnota, jsou transformátory vyráběny s činitelem přepětí 1,9 x Un/8 h. Jeden vývod primárního vinutí, včetně příslušné svorky, je izolován od země na úroveň, která odpovídá jmenovité izolační hodnotě. Transformátor je většinou vybaven dvěma sekundárními vinutími, kde první slouží buď pro měřicí nebo jisticí účely, druhé se zapojuje do otevřeného trojúhelníku (angl. open-delta) u trojfázového systému. Během provozu transformátoru musí být jedna svorka každého použitého sekundárního vinutí a také jedna ze svorek ve spojení do otevřeného trojúhelníku uzemněny. Není-li požadováno jinak, jsou sekundární vinutí vyvedena na sekundární svorkovnici litého typu.

Transformátor může být namontován v jakékoli poloze. Těleso transformátoru se upevňuje čtyřmi šrouby, zemnicí svorka M8 je umístěna na základně transformátoru.
Sekundární svorkovnice je kryta plastovým plombovatelným krytem.

Jmenovitá primární napětí
3/√3 kV; 3.3/√3 kV; 6/√3 kV; 6.6/√3 kV; 10/√3 kV; 11/√3 kV.
Další primární napětí je možno dodávat na požádání.

Jmenovitá sekundární napětí
100/√3 V; 110/√3 V – třídy přesnosti: 0,2; 0,5; 1 (měřicí vinutí) nebo 3P; 6P (jisticí vinutí). Jiná sekundární napětí je na požádání také možno dodávat.

Jmenovitá napětí pro zapojení do otevřeného trojúhelníku:
100/3 V; 110/3 V - třída 6P.
Jiná napětí pro zapojení do otevřeného trojúhelníku je také možno dodávat na základě požadavku zákazníka.

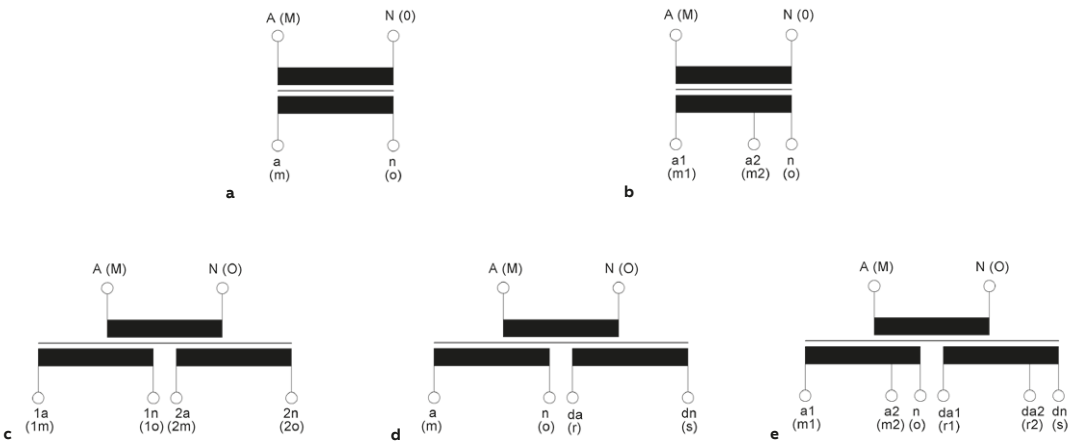
Jmenovitá frekvence
50 Hz; 60 Hz.

Na základě dohody s výrobcem může být transformátor navržen také na dvě hladiny primárního napětí (s přepínáním na sekundární straně).

Transformátory jsou vyráběny v souladu s požadavky a doporučeními následujících norem a předpisů: IEC, VDE, IEEE, BS, GOST a CSN.

Značení vývodů transformátoru napětí – viz obrázek 01 a-e.

—
01 Značení vývodů transformátorů napětí
a Jednopólově izolovaný transformátor
b Jednopólově izolovaný transformátor s odbočkou
c Jednopólově izolovaný transformátor se dvěma sekundárními vinutími
d Jednopólově izolovaný transformátor se dvěma sekundárními vinutími, přičemž jedno z nich je pomocné vinutí
e Jednopólově izolovaný transformátor se dvěma sekundárními vinutími s odbočkami. Jedno z nich je pomocné vinutí.



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01

Standardní provedení transformátorů

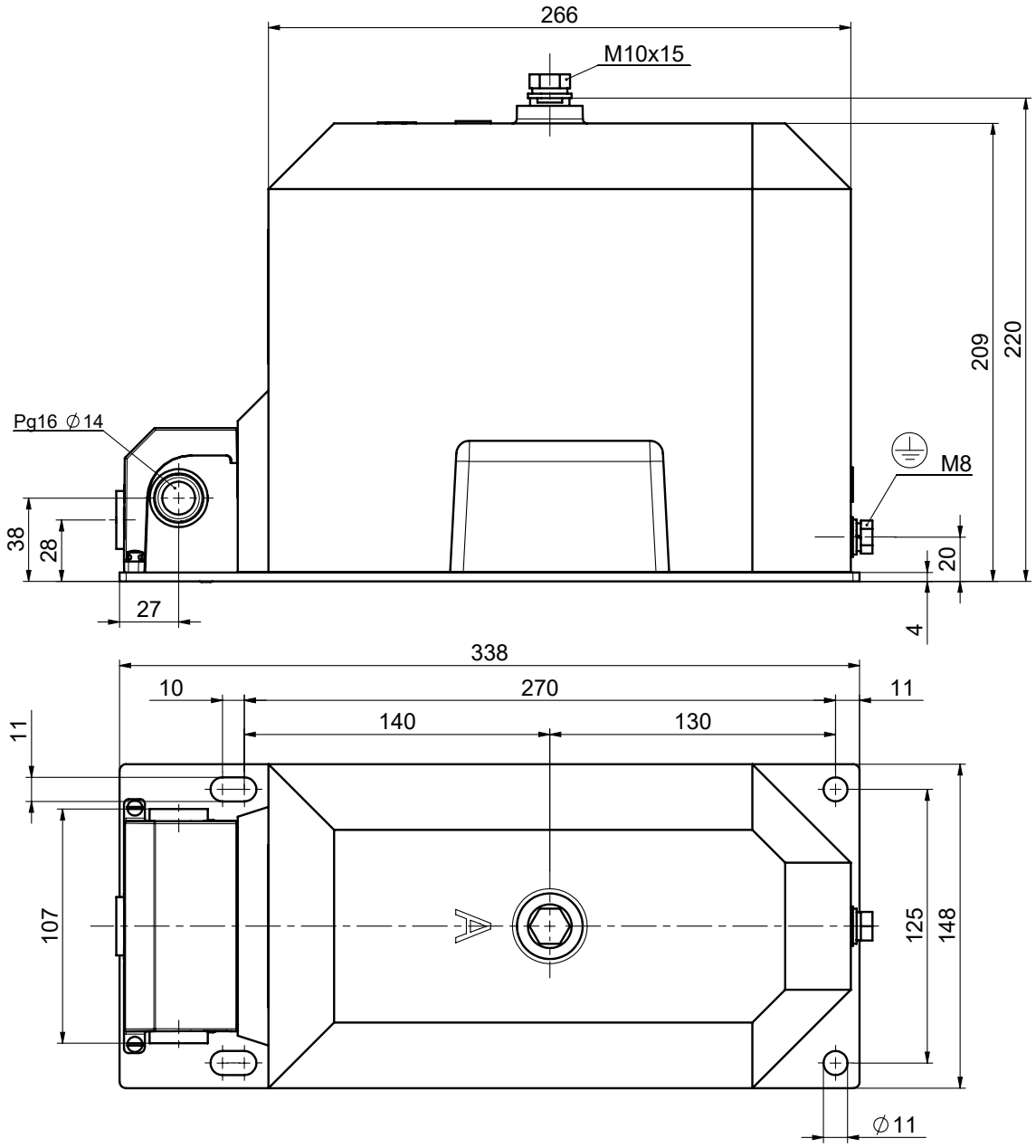
Primární napětí [V]	Sekundární vinutí			Pomocné vinutí		
	napětí, [V]	přesnost	zátěž [VA]	napětí [V]	přesnost	zátěž [VA]
3 000/√3	100/√3	0.2	10;15;25			
3 000/√3	100/√3	0.2	10;15;25	100/3	6P	50
3 000/√3	100/√3	0.2	10;15;25	100/3	6P	100
3 000/√3	100/√3	0.5	15;25;50			
3 000/√3	100/√3	0.5	15;25;50	100/3	6P	50
3 000/√3	100/√3	0.5	15;25;50	100/3	6P	100
3 000/√3	100/√3	1	50;75;100			
3 000/√3	100/√3	1	50;75;100	100/3	6P	50
3 000/√3	100/√3	1	50;75;100	100/3	6P	100
3 300/√3	110/√3	0.2	10;15;25			
3 300/√3	110/√3	0.2	10;15;25	110/3	6P	50
3 300/√3	110/√3	0.2	10;15;25	110/3	6P	100
3 300/√3	110/√3	0.5	15;25;50			
3 300/√3	110/√3	0.5	15;25;50	110/3	6P	50
3 300/√3	110/√3	0.5	15;25;50	110/3	6P	100
3 300/√3	110/√3	1	50;75;100			
3 300/√3	110/√3	1	50;75;100	110/3	6P	50
3 300/√3	110/√3	1	50;75;100	110/3	6P	100
6 000/√3	100/√3	0.2	10;15;25			
6 000/√3	100/√3	0.2	10;15;25	100/3	6P	50
6 000/√3	100/√3	0.2	10;15;25	100/3	6P	100
6 000/√3	100/√3	0.5	15;25;50			
6 000/√3	100/√3	0.5	15;25;50	100/3	6P	50
6 000/√3	100/√3	0.5	15;25;50	100/3	6P	100
6 000/√3	100/√3	1	50;75;100			
6 000/√3	100/√3	1	50;75;100	100/3	6P	50
6 000/√3	100/√3	1	50;75;100	100/3	6P	100
6 600/√3	110/√3	0.2	10;15;25			
6 600/√3	110/√3	0.2	10;15;25	110/3	6P	50
6 600/√3	110/√3	0.2	10;15;25	110/3	6P	100
6 600/√3	110/√3	0.5	15;25;50			
6 600/√3	110/√3	0.5	15;25;50	110/3	6P	50

Primární napětí [V]	Sekundární vinutí			Pomocné vinutí		
	napětí, [V]	přesnost	zátěž [VA]	napětí [V]	přesnost	zátěž [VA]
6 600/√3	110/√3	0.5	15;25;50	110/3	6P	100
6 600/√3	110/√3	1	50;75;100			
6 600/√3	110/√3	1	50;75;100	110/3	6P	50
6 600/√3	110/√3	1	50;75;100	110/3	6P	100
10 000/√3	100/√3	0.2	10;15;25			
10 000/√3	100/√3	0.2	10;15;25	100/3	6P	50
10 000/√3	100/√3	0.2	10;15;25	100/3	6P	100
10 000/√3	110/√3	0.2	10;15;25			
10 000/√3	110/√3	0.2	10;15;25	110/3	6P	50
10 000/√3	110/√3	0.2	10;15;25	110/3	6P	100
10 000/√3	100/√3	0.5	15;25;50			
10 000/√3	100/√3	0.5	15;25;50	100/3	6P	50
10 000/√3	100/√3	0.5	15;25;50	100/3	6P	100
10 000/√3	110/√3	0.5	15;25;50			
10 000/√3	110/√3	0.5	15;25;50	110/3	6P	50
10 000/√3	110/√3	0.5	15;25;50	110/3	6P	100
10 000/√3	100/√3	1	50;75;100			
10 000/√3	100/√3	1	50;75;100	100/3	6P	50
10 000/√3	100/√3	1	50;75;100	100/3	6P	100
10 000/√3	110/√3	1	50;75;100			
10 000/√3	110/√3	1	50;75;100	110/3	6P	50
10 000/√3	110/√3	1	50;75;100	110/3	6P	100
11 000/√3	100/√3	0.2	10;15;25			
11 000/√3	100/√3	0.2	10;15;25	100/3	6P	50
11 000/√3	100/√3	0.2	10;15;25	100/3	6P	100
11 000/√3	110/√3	0.2	10;15;25			
11 000/√3	110/√3	0.2	10;15;25	110/3	6P	50
11 000/√3	110/√3	0.2	10;15;25	110/3	6P	100
11 000/√3	100/√3	0.5	15;25;50			
11 000/√3	100/√3	0.5	15;25;50	100/3	6P	50
11 000/√3	100/√3	0.5	15;25;50	100/3	6P	100
11 000/√3	110/√3	0.5	15;25;50			
11 000/√3	110/√3	0.5	15;25;50	110/3	6P	50
11 000/√3	110/√3	0.5	15;25;50	110/3	6P	100
11 000/√3	100/√3	1	50;75;100			
11 000/√3	100/√3	1	50;75;100	100/3	6P	50
11 000/√3	100/√3	1	50;75;100	100/3	6P	100
11 000/√3	110/√3	1	50;75;100			
11 000/√3	110/√3	1	50;75;100	110/3	6P	50
11 000/√3	110/√3	1	50;75;100	110/3	6P	100

Rozměrový výkres

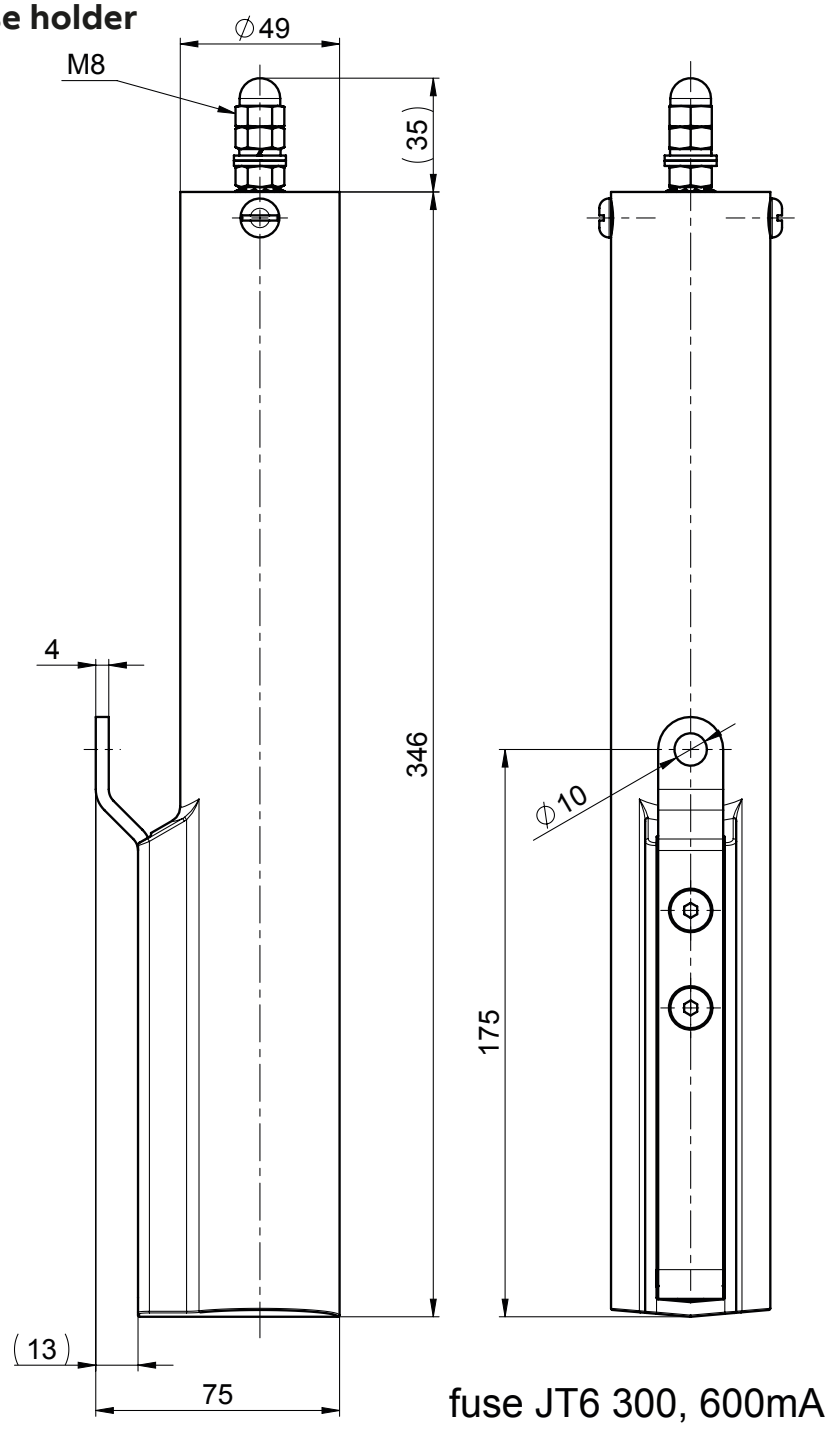
TJC 4

Hmotnost cca: 20 kg
Povrchová vzdálenost: 280 mm



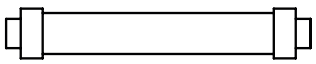
Výkres č.
44203570

External fuse holder



fuse JT6 300, 600mA

fuse JT6 300 mA	1VL4200499R0101
fuse JT6 600 mA	1VL4200499R0102



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Vídeňská 117, 619 00 Brno,
Česká republika
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POZN.:
Vyhrazujeme si veškerá práva na provádění technických změn nebo změnu obsahu tohoto dokumentu bez předchozího oznámení. Pokud se týká objednávek, platí konkrétně dohodnuté údaje. Společnost ABB nepřebírá jakoukoli odpovědnost za případné chyby nebo chybějící informace v tomto dokumentu.

1VLC000520 Rev.5, CZ

Medium Voltage Product

TJP 4.3, TJP 5.3, TJP 6.3
Indoor voltage transformers

Highest voltage for equipment	[kV]	3.6 - 24(25)
Power frequency test voltage, 1 min.	[kV]	10 - 50
Lightning impulse test voltage	[kV]	40 - 125
SesuF	[A]	2 or 6,3 (IEC)
Max. rated burden, classes	[VA/cl]	25/0.2 - 50/0.5 - 100/1
Residual winding	[VA/cl]	50 - 200/6P

Description

TJP 4.3, TJP 5.3 , TJP 6.3 epoxy insulated voltage transformers are cast in epoxy resin and designed mostly for insulation voltages of
- 3.6 kV to 12 kV....TJP 4.3 type
- 17,5 kV..... TJP 5.3 type
- 24 (25)kV.....TJP 6.3 type

Trasformers are suitable for ABB UNISAFE panel or PowerCube type PB.
If no a different value is required, the transformers are manufactured with a overvoltage factor of 1.9 x Un/8 hrs.
One outlet of the primary winding, including the respective terminal is insulated from the earth to a level which corresponds to the rated insulation value.
Other outlet of primary winding with its terminal is earthed during the operation.
Most of the transformers are equipped with two secondary windings, the first one for either measuring or protection purposes, other for being connected into an open-delta connection in a three-phase system. One terminal of each secondary winding and one of the open delta connected terminals have to be earthed during the transformer operation.
The secondary windings are lead out into a cast-type secondary terminal board. The transformer can be mounted in any position.
Transformer body is fixed by four screws, the bolted M8 earthing clamp is located on the transformer base plate.

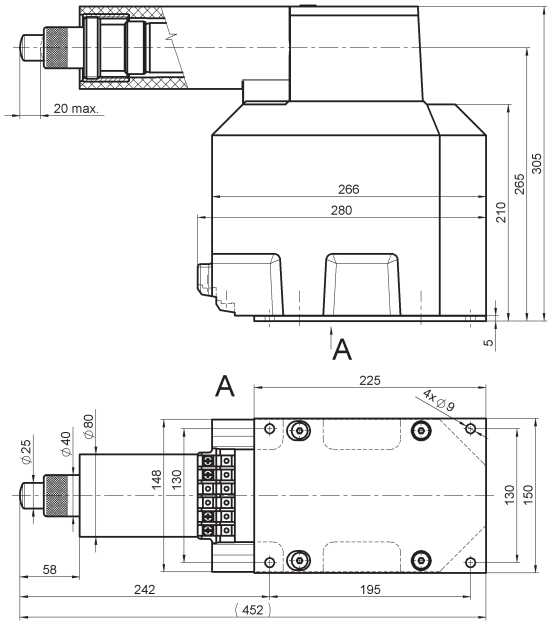
The TJP 4.3, TJP 5.3 , TJP 6.3 transformers are equipped with a fuses conformably to IEC standard.

Rated primary voltages ... 3/V3 kV; 3,3/V3 kV; 6/V3 kV; 6,6/V3 kV; 10/V3 kV; 11/V3 kV, 13,8/V3 kV, 15/V3 kV; 20/V3 kV, 22/V3 kV
Other primary voltages can also be supplied upon request.
Rated secondary voltages... 100/V3 V; 110/V3 V – accuracy classes 0.2; 0.5; 1 (measuring winding) or 3P; 6P (protection winding).
Other secondary voltages can also be supplied upon request.
Rated voltages for open-delta connection: ... 100/3 V; 110/3 V- class 6P. Other voltages for open-delta connection can also be supplied based on customer requirement.
Rated frequency ... 50 Hz; 60 Hz
Based on a discussion with the manufacturer the transformer can also be provided with primary winding designed for two different primary voltages (with secondary side changeover).
Transformers are manufactured conformably to the requirements and recommendations of the following standards and regulations: IEC, VDE, ANSI, BS, GOST, CSN.

Dimensions

TJP 4.3
TJP 5.3

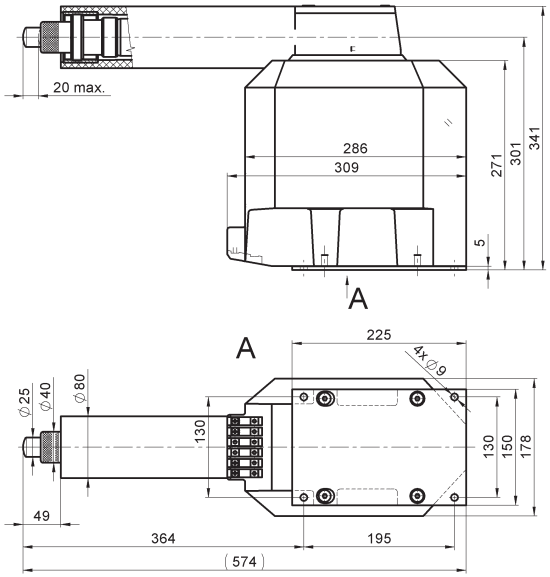
WEIGHT: appr. 28kg
CREP. DISTANCE: 385mm



Drawing n.
1VL4200314R0101

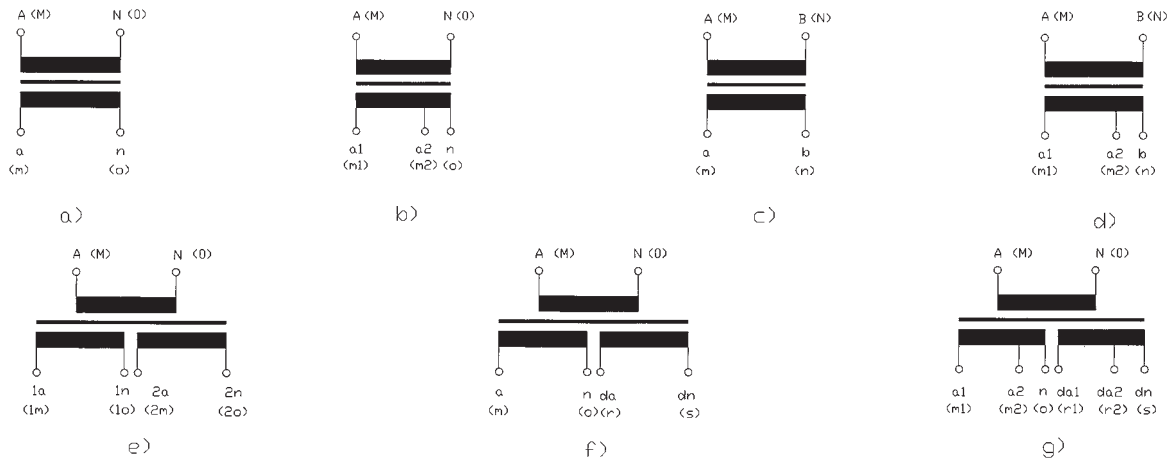
TJP 6.3

WEIGHT: appr. 42kg
CREP. DISTANCE: 547mm



Drawing n.
1VL4200315R0101

Marking of the voltage transformer outlets



a) Single-pole insulated transformer | b) Single-pole insulated transformer with a tap | c) Double-pole insulated transformer | d) Double-pole insulated transformer with a tap | e) Single-pole insulated transformer with two secondary windings | f) Single-pole insulated transformer with two secondary windings, with one of which being the auxiliary (residual) winding | g) Single-pole insulated transformer with two secondary, tapped windings, with one which being the auxiliary (residual) winding.

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1VLC000538 - Rev.-,en 2011, 06. 28

MEDIUM VOLTAGE PRODUCT

TPU 4x.xx

Indoor supporting current transformers

Parameters	Values
Highest voltage for equipment	3.6 - 12 kV
Power frequency test voltage, 1 min.	10 - 42 kV
Lighting impulse test voltage	40 - 95 kV
Rated primary current	10 - 3 200 A
Rated short-time thermal current	2 - 100 kA/ 1s
Reconnectable (primary till 400-800 A)	primary or secondary

Description
The TPU 4x.xx transformers are cast in epoxy resin and designed for insulation voltages up to 12 kV. The 3.6 kV and 7.2 kV versions have the same dimensions as the 12 kV. For certain types of panels there is a need for extra long creepage distance on the transformers. For this purpose you can order current transformers with „ribs on the top". The transformers are manufactured in conformity with dimensions stated hereunder. The TPU 4x.xx transformers are designed as single-turn or multi-turn versions, with one transformer ratio or with double ratio having the possibility to be reconnectable on the primary or on the secondary side. The number of secondary windings (from 1 to 6 – max. 12 secondary terminals - 2 rows), depends on the combination of the technical parameters (such as the accuracy class, burden, short-circuit current, overcurrent factor…) and the transformer dimensions size.

When agreed between the manufacturer and the customer the TPU transformers can be provided with the voltage indication system. For this purpose, however, it is necessary to know in what insulation level the transformers shall operate. The secondary windings are used for measurement or protection purposes, or for special use (testing winding, „X" class windings). One terminal of each secondary winding used and one terminal of short-circuited and not used winding have to be earthed during the transformer operation. The secondary windings are lead out into a cast-type secondary terminal box with plastic cover. The terminal cover is sealable. The terminals are provided with M5 screws for the termination and with throughgoing holes for direct earting (first row of secondary terminals).

Technical data
The transformer can be mounted in any position. The transformer body is fixed by using four screws. Earth clamp M8 is on the transformer base plate.

Rated primary voltages
3.6 kV; 7.2 kV; 12 kV

Rated primary currents
10; 15; 20; 25; 30; 40; 50; 60; 75; 100; 150; 200; 300; 400; 500; 600; 750; 1 000; 1 250; 1 500; 2 000; 2 500; 3 000 and 3 200 A; primary reconnectable modification max till 400-800 A. Other primary currents can also be agreed upon with the customer.

Rated secondary currents
5 A; 1 A, others on request (possibility to combine different values in one transformer)

Accuracy classes
0.2; 0.2S; 0.5; 0.5S; 1; 3; 5; 5P10; 5P15; 5P20; 10P10; 10P15; 10P20; others on request.

Rated frequency
50 Hz or 60 Hz, others on request

The transformers are designed and manufactured in conformity with the following standards and recommendations: IEC, VDE, IEEE, BS, GOST and CSN, others on request.

Cantilever strength
5 kN

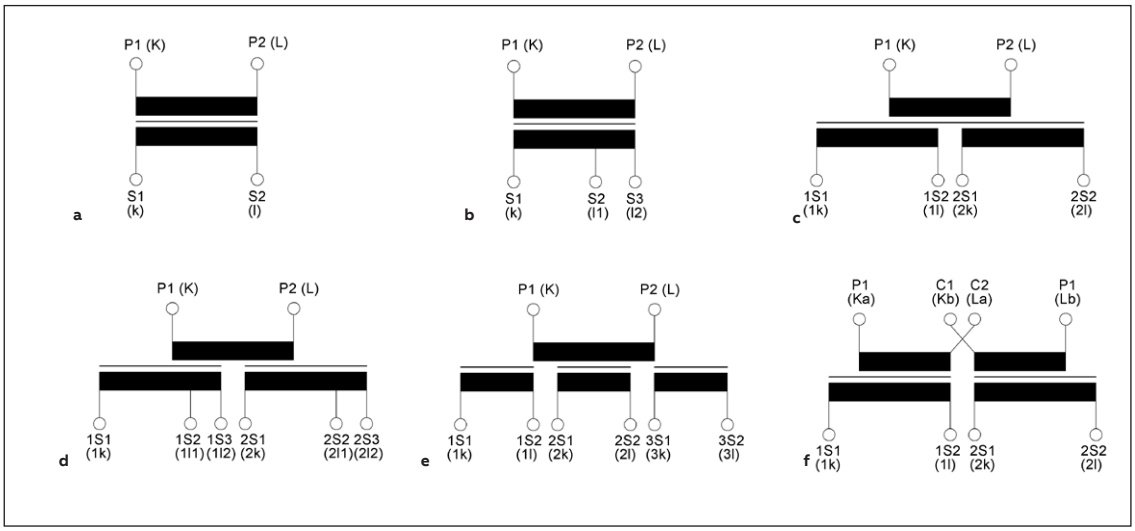
Permissable torques for screw connections		
M5	max 3.5 Nm	min 2.8 Nm
M8	max 20 Nm	min 16 Nm
M12	max 70 Nm	min 56 Nm

—
01 Marking of current transformer outlets - example
a Single-core design
b Single-core design, reconnectable on the secondary side
c Double-core design
d Double-core design, reconnectable on the secondary side
e Three-core design
f Double-core design, reconnectable on the primary side

Code designation - TPU current transformers

TPU	x	x	.	x	x
	voltage	**current**		**dimension**	**primary terminals**
	4….up to 12 kV	0… to 600 A multiturn 1… to 1 250 A, combi multiturn, singleturn* 3…to 1 250 A singleturn 4…to 1 500 A singleturn 5…to 2 000 A singleturn 6…to 2 500 A singleturn 7…to 3 000 A singleturn 8…to 3 200 A singleturn		1..short 148 mm, DIN 2..long 148 mm, DIN 3..short, wide.. 184 mm 4..long, wide…184 mm 5..middle 148 mm, DIN	1..no pr.rec., no ribs /40x80mm, 80x80mm/ 2..prim. rec., no ribs /40x80mm, 80x80mm/ 3..no pr.rec., with ribs /60x68mm, 80x80mm/ 4..prim. rec., with ribs /40x80mm, 80x80mm/

* TPU 41.41 and TPU 41.43 only



—
01

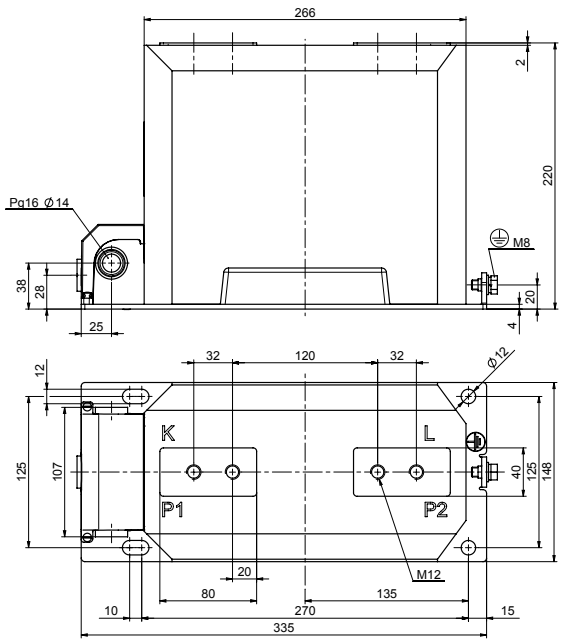
Standartized insulation levels of TPU 4x.xx transformers

3.6 / 10 / 40 kV	12 / 28 / 75 kV
7.2 / 20 / 60 kV	12 / 35 / 75 kV
	12 / 42 / 95 kV

Dimensional Drawings

TPU 40.11
TPU 43.11

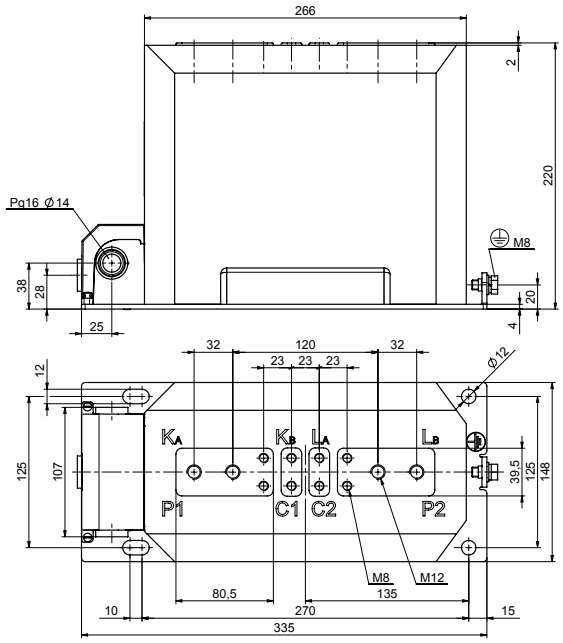
Weight: 20-24kg
Creepage distance:201 mm



Drawing n.	Polarity
44614000	P1 to secondary terminal
44614010	P2 to secondary terminal

TPU 40.12

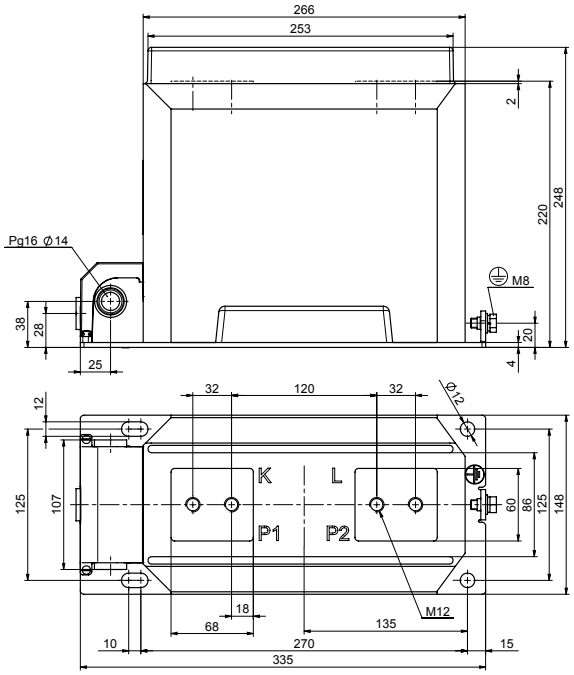
Weight: 19-25kg
Creepage distance: 215 mm



Drawing n.	Polarity
44614020	P1 to secondary terminal
44614030	P2 to secondary terminal

TPU 40.13
TPU 43.13

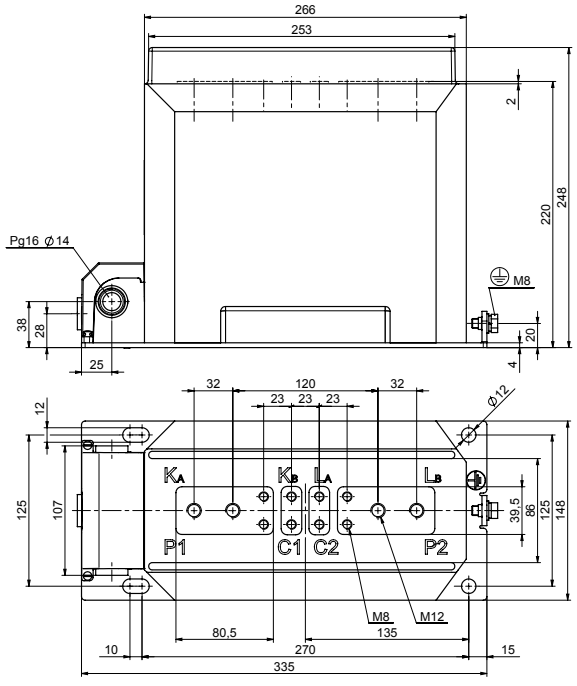
Weight: 20-24kg
Creepage distance: 214mm



Drawing n.	Polarity
44614040	P1 to secondary terminal
44614050	P2 to secondary terminal

TPU 40.14

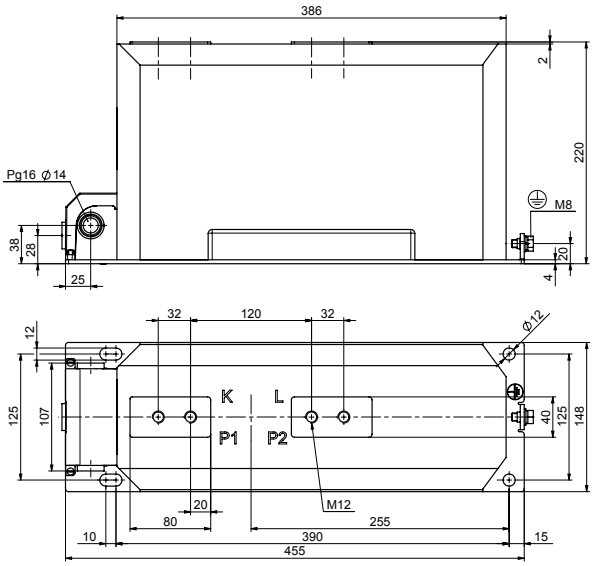
Weight: 19-25kg
Creepage distance: 201mm



Drawing n.	Polarity
44614060	P1 to secondary terminal
44614070	P2 to secondary terminal

TPU 40.21
TPU 43.21

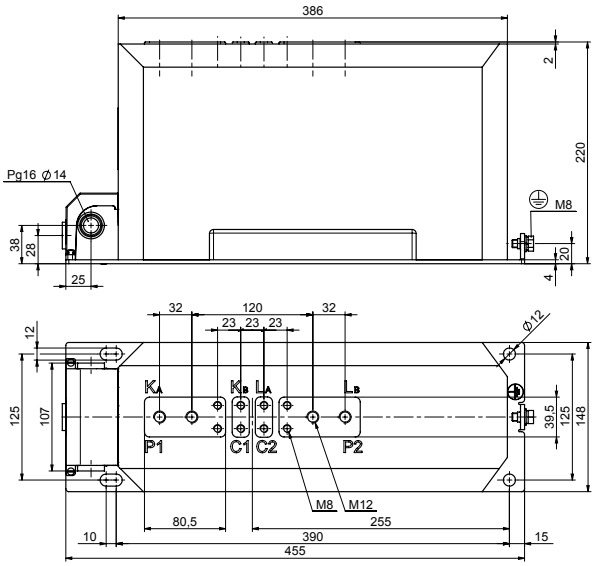
Weight: 29-37kg
Creepage distance: 201mm



Drawing n.	Polarity
44614080	P1 to secondary terminal
44614090	P2 to secondary terminal

TPU 40.22

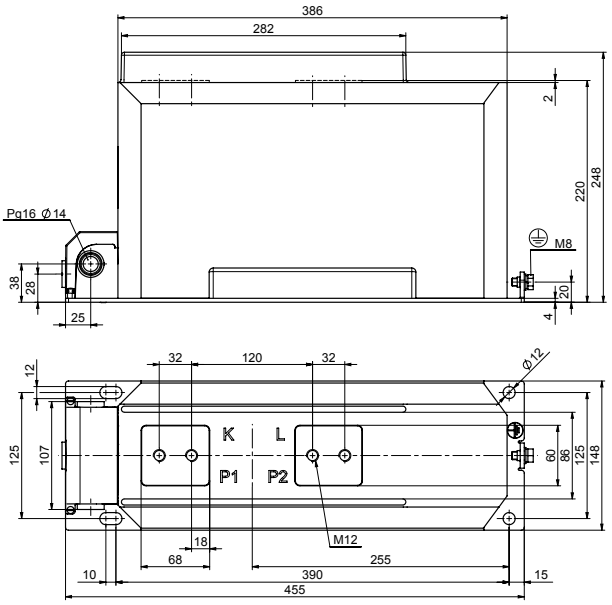
Weight: 29-37kg
Creepage distance: 215mm



Drawing n.	Polarity
44614100	P1 to secondary terminal
44614110	P2 to secondary terminal

TPU 40.23
TPU 43.23

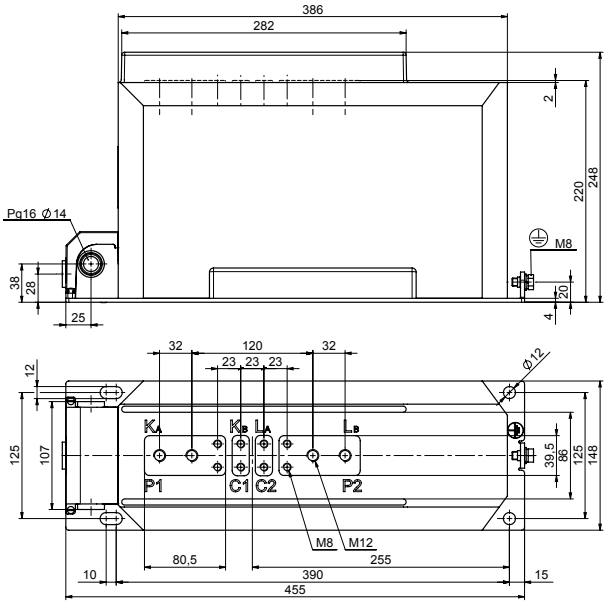
Weight: 29-37kg
Creepage distance: 214mm



Drawing n.	Polarity
44614120	P1 to secondary terminal
44614130	P2 to secondary terminal

TPU 40.24

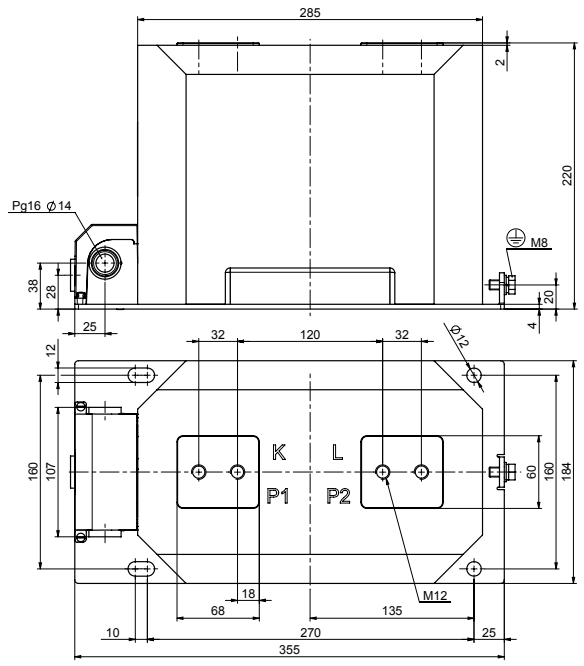
Weight: 29-37kg
Creepage distance: 215mm



Drawing n.	Polarity
44614140	P1 to secondary terminal
44614150	P2 to secondary terminal

TPU 40.31
TPU 43.31

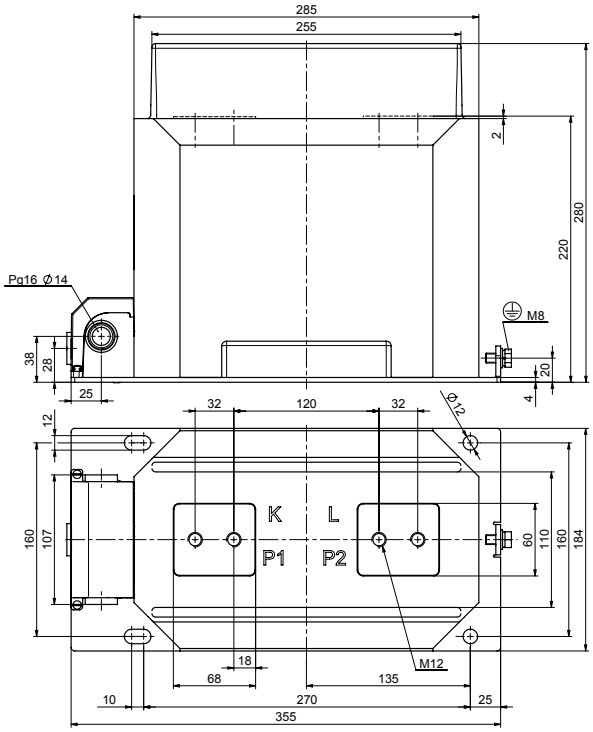
Weight: 31-39kg
Creepage distance: 215mm



Drawing n.	Polarity
44614160	P1 to secondary terminal
44614170	P2 to secondary terminal

TPU 40.33
TPU 43.33

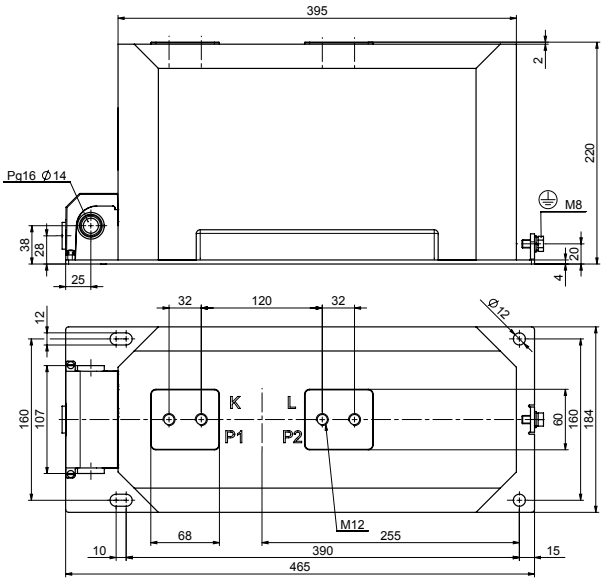
Weight: 31-39kg
Creepage distance: 215mm



Drawing n.	Polarity
44614180	P1 to secondary terminal
44614190	P2 to secondary terminal

TPU 40.41
TPU 41.41
TPU 43.41

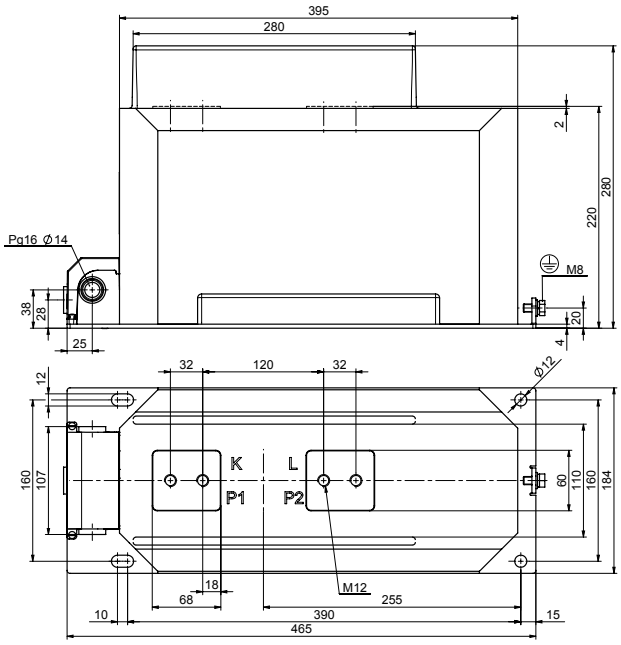
Weight: 45-55kg
Creepage distance: 215mm



Drawing n.	Polarity
44614200	P1 to secondary terminal
44614210	P2 to secondary terminal

TPU 40.43
TPU 41.43
TPU 43.43

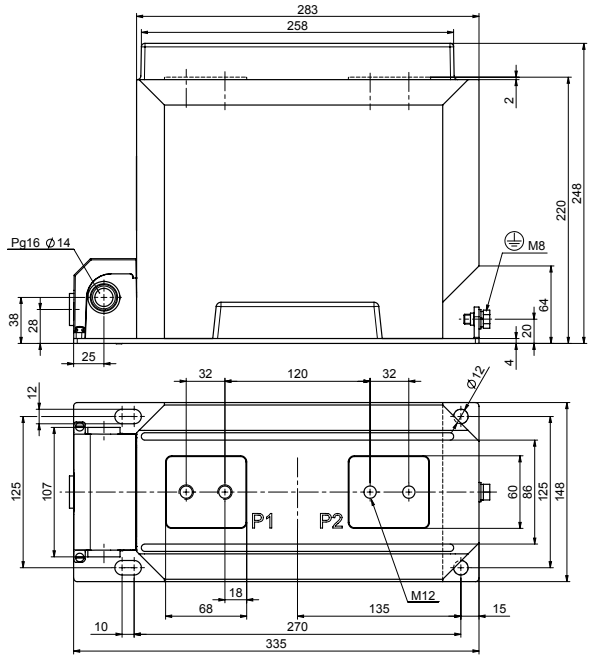
Weight: 45-55kg
Creepage distance: 215mm



Drawing n.	Polarity
44614220	P1 to secondary terminal
44614230	P2 to secondary terminal

TPU 40.53
TPU 43.53

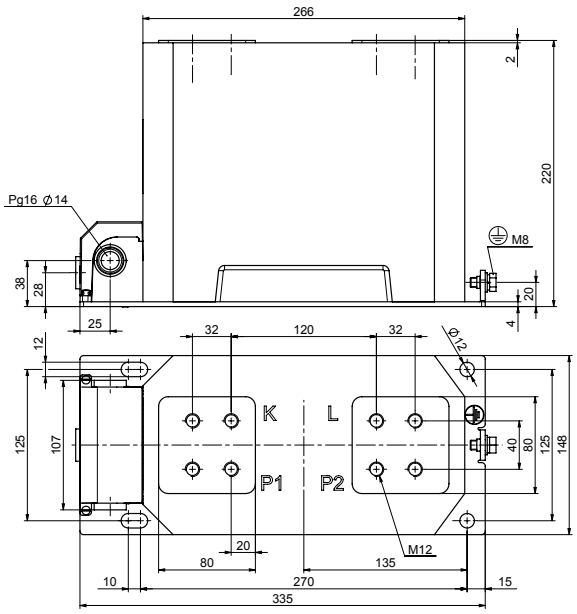
Weight: 28kg
Creepage distance: 214mm



Drawing n.	Polarity
1VL4600921R0101	P1 to secondary terminal
1VL4600921R0102	P2 to secondary terminal

TPU 44.11
TPU 45.11
TPU 46.11
TPU 47.11
TPU 48.11

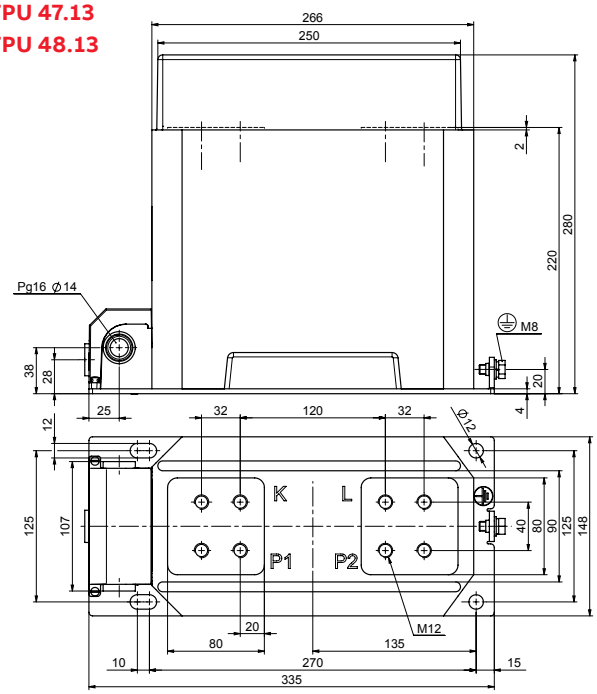
Weight: 25-31kg
Creepage distance: 201mm



Drawing n.	Polarity
44614240	P1 to secondary terminal
44614250	P2 to secondary terminal

TPU 44.13
TPU 45.13
TPU 46.13
TPU 47.13
TPU 48.13

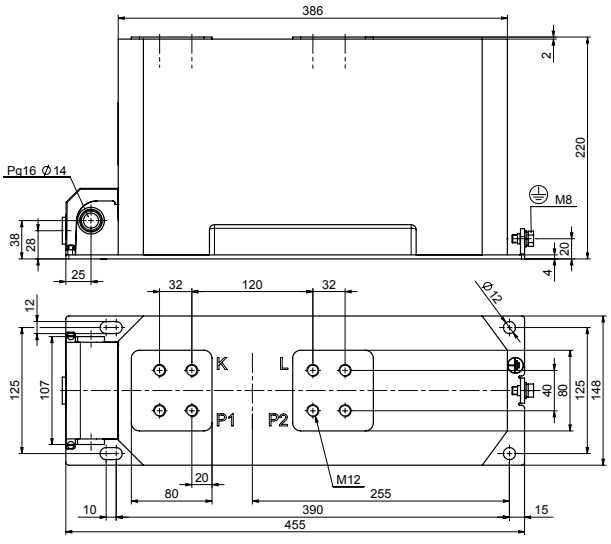
Weight: 25-31kg
Creepage distance: 201mm



Drawing n.	Polarity
44614260	P1 to secondary terminal
44614270	P2 to secondary terminal

TPU 44.21
TPU 45.21
TPU 46.21
TPU 47.21
TPU 48.21

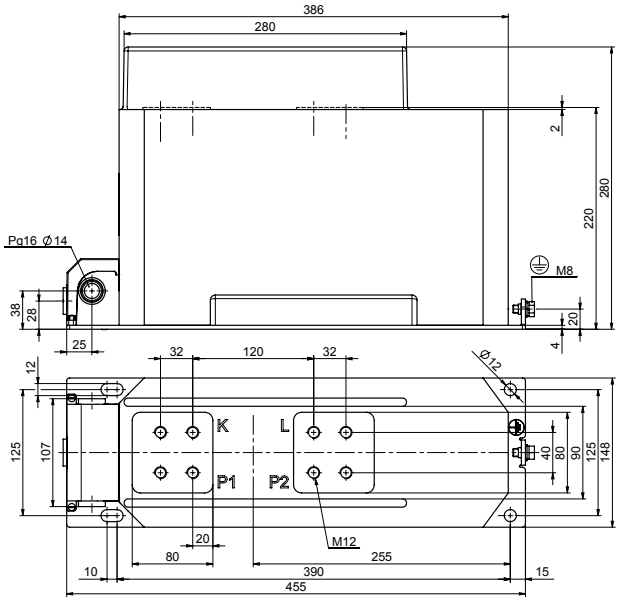
Weight: 40-45kg
Creepage distance: 201mm



Drawing n.	Polarity
44614280	P1 to secondary terminal
44614290	P2 to secondary terminal

TPU 44.23
TPU 45.23
TPU 46.23
TPU 47.23
TPU 48.23

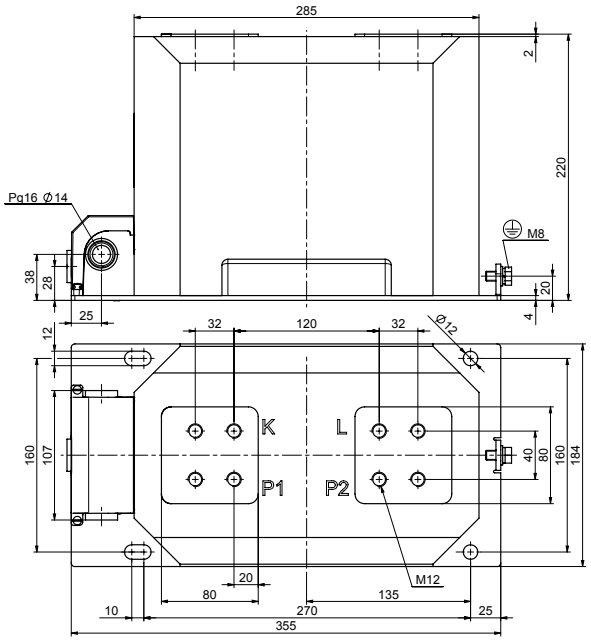
Weight: 40-45kg
Creepage distance: 201mm



Drawing n.	Polarity
44614300	P1 to secondary terminal
44614310	P2 to secondary terminal

TPU 44.31
TPU 45.31
TPU 46.31
TPU 47.31
TPU 48.31

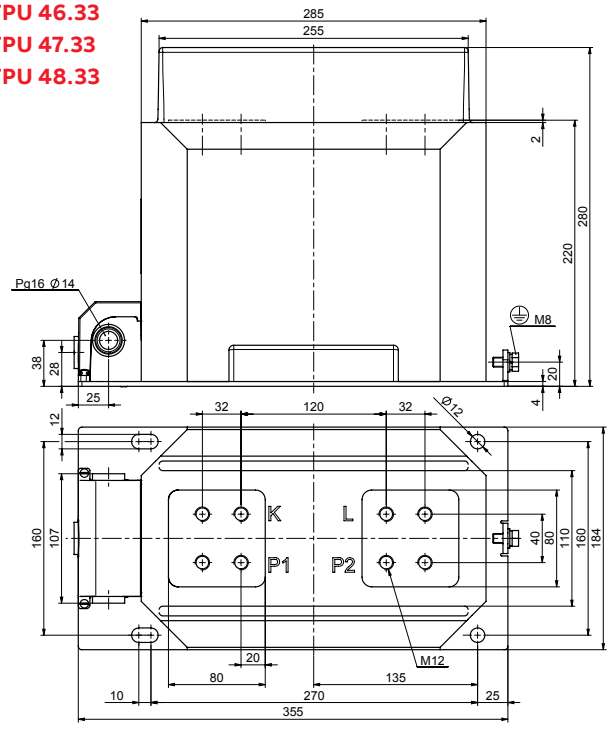
Weight: 34-42kg
Creepage distance: 210 mm



Drawing n.	Polarity
44614320	P1 to secondary terminal
44614330	P2 to secondary terminal

TPU 44.33
TPU 45.33
TPU 46.33
TPU 47.33
TPU 48.33

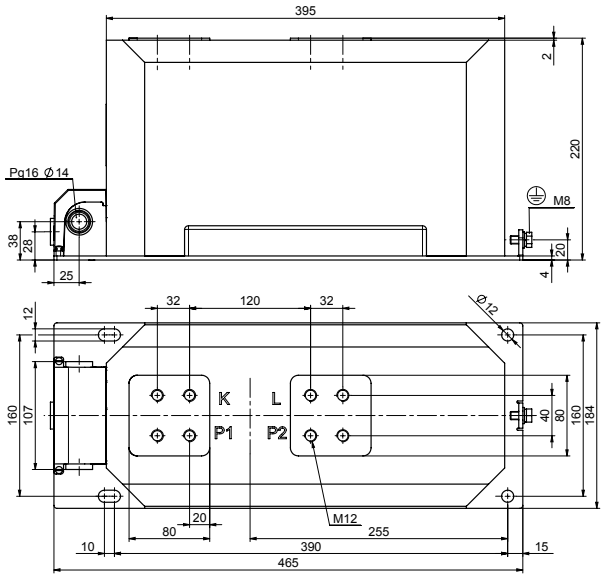
Weight: 34-42kg
Creepage distance: 210mm



Drawing n.	Polarity
44614340	P1 to secondary terminal
44614350	P2 to secondary terminal

TPU 44.41
TPU 45.41
TPU 46.41
TPU 47.41
TPU 48.41

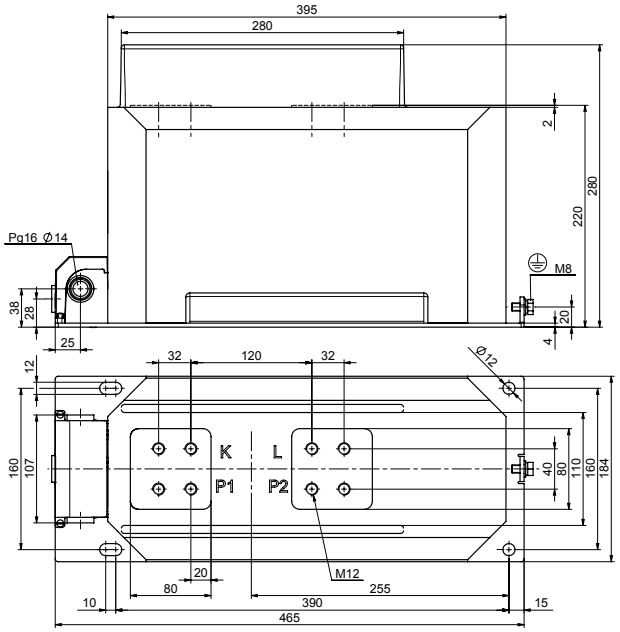
Weight: 46-58kg
Creepage distance: 210mm



Drawing n.	Polarity
44614360	P1 to secondary terminal
44614370	P2 to secondary terminal

TPU 44.43
TPU 45.43
TPU 46.43
TPU 47.43
TPU 48.43

Weight: 46-58kg
Creepage distance: 210mm



Drawing n.	Polarity
44614380	P1 to secondary terminal
44614390	P2 to secondary terminal

CONTACT US
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Videnska 117, 619 00 Brno,
Czech Republic

[redacted]

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NOTE
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1VLC000501 Rev.8, en 2017.06.28

BEM	Technische Daten / *technical data*	GH80L04P1Q5	Rev.B

Nenndaten / *nominal data*

Leistung *rating power*	S_N:	**17531** kVA	=	14025 kWe 14340 kWm	cos *p.f.*	φ:	**0.80**	Sehnungsfaktor *pitch factor*	**5/6**
Spannung *voltage*	U_N:	**6300** V			Strom *current*	I_N:	**1607** A		
Frequenz *frequency*	f:	**50** /s		*4* polig *poles*	Drehzahl *speed*	n:	**1500** /min		

Reaktanzen und Zeitkonstanten / *reactances and time constants*

	unsat.	sat.			unsat.	sat.				
x_d:	**2.379**	**2.207**	p.u.	x_q:	**1.081**	**1.060**	p.u.	Z_N:	**2.2640**	Ω
x_d':	**0.279**	**0.278**	p.u.	x_q':	**1.081**	**1.060**	p.u.	T_{d0}':	**8.112**	s
x_d'':	**0.251**	**0.229**	p.u.	x_q'':	**0.276**	**0.276**	p.u.	T_d':	**0.952**	s
x_2:	**0.293**	**0.290**	p.u.	x_0:	**0.075**	**0.069**	p.u.	T_d'':	**0.128**	s
x_{1s}:	**n.a.**	**0.137**	p.u.	x_{pot}:	**n.a.**		p.u.*	T_a:	**0.357**	s
								T_{d0}'':	**0.155**	s
R1: (20°C)			Ω	scr:	**0.453**			T_{q0}':	**2.554**	s
r_a: (20°C)			p.u.*					T_{q0}'':	**1.000**	s
r_1: (20°C)			p.u.*					T_q':	**2.554**	s
r_2: (20°C)			p.u.*					T_q'':	**0.255**	s
**if not mentioned, see valid test sheet*								T_{Dd}:	**0.255**	s

Wirkungsgrad / efficiency		1/4*P_N	2/4*P_N	3/4*P_N	4/4*P_N	1.1*P_N
η [%] p.f.=	0.80	94.96	96.94	97.55	97.80	97.86
η [%] p.f.=	0.85	95.01	97.00	97.62	97.88	97.94
η [%] p.f.=	0.90	95.06	97.07	97.69	97.97	98.03
η [%] p.f.=	1.00	95.16	97.19	97.84	98.13	98.20
η [%] p.f.=						

Kurzschlußdaten / *short circuit data*

			p. u.
I_k'':	**7012** A	Anfangskurzschlußwechselstrom (3~) / *initial short circuit current (3~)*	4. 36
i_S:	**17847** A	Stoßkurzschlußstrom (3~) / *max. peak current (3~)*	11. 11
$I_{k>=}$:	**4820** A	Dauerkurzschlußstrom (3~) / *sustained short circuit current (3~)*	3. 00
M_{k2}:	**633.2** kNm	Stoßkurzschlußmoment (2~) / *initial short circuit torque (2~)*	5. 67
M_f:	**1361.4** kNm	Max.Fehlsynchronisationsmoment / *max. faulty synchron.torque*	12. 20
M_{SN}:	**111.62** kNm	Nennscheinmoment / rated kVA torque=	1. 00
M_N:	**89.29** kNm	Nennmoment / rated torque	0. 80
dU':	**-21.8** %	Transienter Spannungseinbruch bei Laststoß p.f.0,8/ *TVD at load application with p.f.0,8*	
$dS_{max.}$<=	**9417** kVA	Max. Laststoß bei p.f.0.2 mit dU'<=15% / *Max. load application at p.f.0.2 for TVD<=15%*	

Sonstige Daten / *other data*

Trägheitsmoment / inertia J:	**1400** kgm²	Gewicht m: *weight*	**35500** kg
Inertia constant alternator only H:	**0.989** s		
Kühlluftmenge Q_L: *cooling air volume*	**10.0** m³/s	Kühlmitteltemp.: *cooling medium temp*	**50** °C
Schutzart: *enclosure*	**IP54**	Isolationsklasse: *insulation class*	F

Bemerkungen / remarks

Order/project No.: -

**exact values see valid drawing*

Temperature rise according to B

Cooling type IC81W air-water cooler, 2x 66% cooling elements- water inlet temperature 35°C

PMG excitation system

Alle Angaben sind gemäß VDE 0530, IEC600 34 — ***All data are in accordance to VDE 0530, IEC600 34***

LZT,31.03.2025

CIRCOR ALLWEILER

Characteristic curves for screw pumps

Quotation no.
A-20 365

Date 25.11.2020 Name

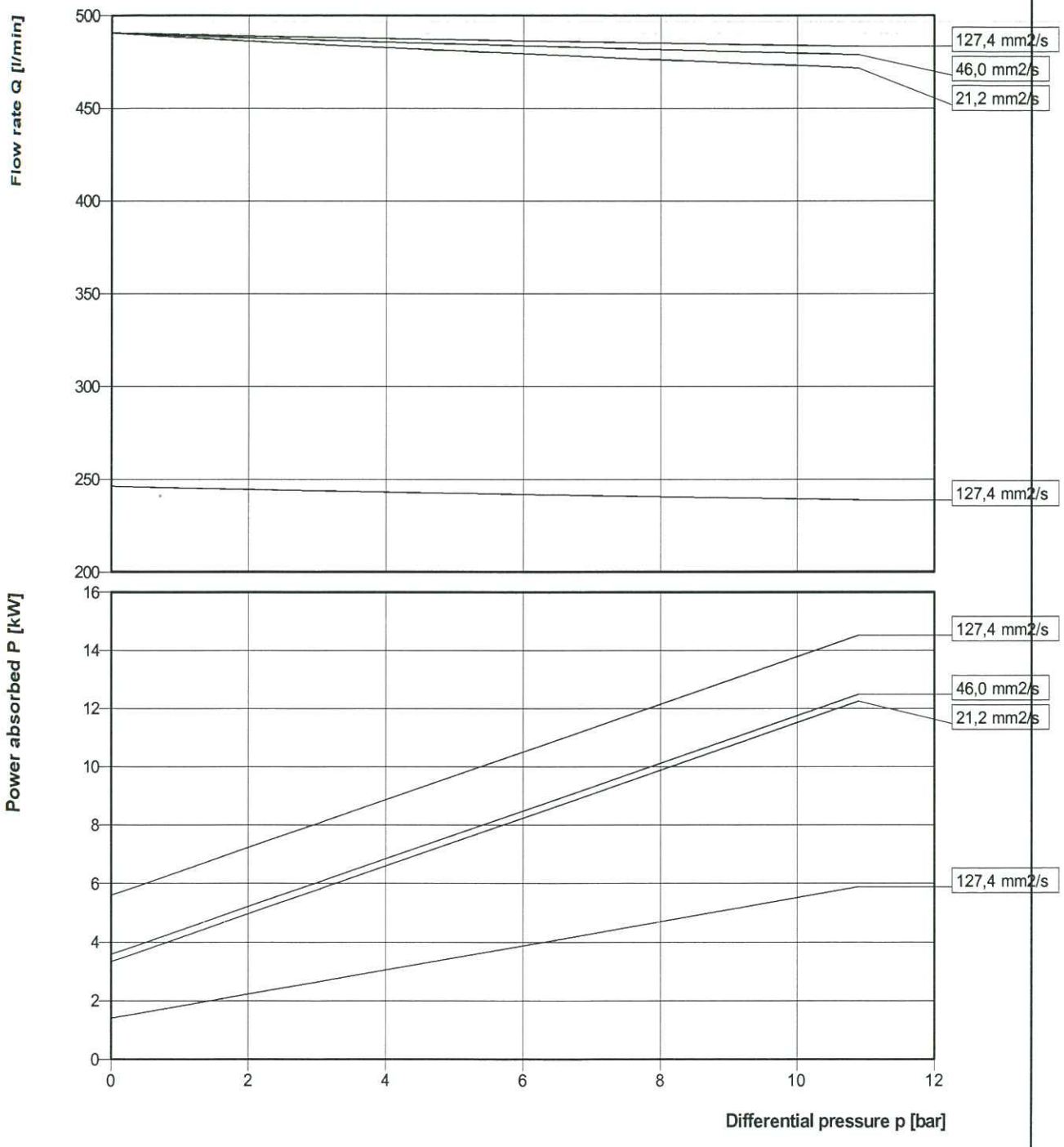
Pump type **RUV** Size of pump **280** Pitch angle **43**

Project no. Lublin

Item

				1#	2#	3#	4#	
1	Liquid pumped	ISO VG 46	Pump capacity	478 l/min	483 l/min	486 l/min	241 l/min	2
2	Density	0,847 kg/dm3	Power req.	8,6 kW	8,9 kW	10,9 kW	4,1 kW	3
3	Rotor housing	GK-AlSi9Mg-wa	Starting torque	28,8 Nm	29,6 Nm	36,3 Nm	27,0 Nm	4
4	I(rotor)	0,00172 kgm2	Total efficiency	59,9 %	58,9 %	48,2 %	64,2 %	5
5	I(coupl)	kgm2	Differential pressure	6,5 bar	6,5 bar	6,5 bar	6,5 bar	6
6	I(mag.coupl)	kgm2	Speed	2870 1/min	2870 1/min	2870 1/min	1440 1/min	7
7	I(total)	0,00172 kgm2	Temperature	60 °C	40,0 °C	20,0 °C	20,0 °C	8
8	Calculation reference acc. to		Viscosity	21,2 mm2/s	46,0 mm2/s	127 mm2/s	127 mm2/s	9
9	VDMA 24 284 class II groupe II		NPSH(pump)	3,5 mWs	3,9 mWs	5,1 mWs	2,0 mWs	10
10								11
11	Remarks							

NPSH-value without safety margins



CIRCOR ALLWEILER

Pump data sheet

Quotation no.
A-20 365

Date 25.11.2020 Name

Quotation for company	Ekol
Order no	
Project no.	Lublin
Prepared by	
Pump type	RUV 280 43
Rotor housing	GK-AlSi9Mg-wa
Liquid pumped	ISO Lube / ISO VG 46

Operating conditions		**1#**	**2#**	**3#**	**4#**
Q(req)	l/min	400			
p(inlet)	bar	0,000	0,000	0,000	0,000
p(outlet)	bar	6,5	6,5	6,5	6,5
p(diff)	bar	6,5	6,5	6,5	6,5
Speed	1/min	2870	2870	2870	1440
Temperature	°C	60	40,0	20,0	20,0
Viscosity	mm2/s	21,2	46,0	127	127
Density	kg/dm3	0,847			
Calculated pump data					
Q(calc)	l/min	478	483	486	241
P(req)	kW	8,6	8,9	10,9	4,1
Eta(vol)	%	97,5	98,4	99,0	98,1
Eta(tot)	%	59,9	58,9	48,2	64,2
pg(dyn)	bar	16,0	16,0	16,0	16,0
pg(stat)	bar	--	--	--	--
NPSH(pump)	mWs	3,5	3,9	5,1	2,0

Remarks: NPSH-value without safety margins

I(rotor)	kgm2	0,00172
I(coupl)	kgm2	
I(mag.coupl)	kgm2	
I(total)	kgm2	0,00172

Referring documents

Calculation reference acc. to	VDMA 24 284 class II groupe II
Admissible tolerances of capacity	dQ = Q * (-5..+10%)

Datasheet for three-phase Squirrel-Cage-Motors SIMOTICS

Motor type : 1AV1162J - 160 M - (G) IM V1 / IM3011 - p

Client order no.	Item-No.	Offer no.
Order no.	Consignment no.	project
Remarks		

Electrical data

U [V]	Δ / Y	f [Hz]	P [kW]	P [hp]	I [A]	n [1/min]	M [Nm]	η 3) 4/4	η 3) 3/4	η 3) 2/4	cosφ 3) 4/4	cosφ 3) 3/4	cosφ 3) 2/4	I_A/I_N I_I/I_N	M_A/M_N T_I/T_N	M_K/M_N T_B/T_N	IE-CL
400	Δ	50	9.30	-/-	18.30	1440	61.7	84.5			0.87			5.7	1.7	2.8	
400	Y	50	11.50	-/-	22.00	2870	38.3	82.0			0.92			6.0	1.8	2.9	
(G) IM V1 / IM3011			FS 160 M	62 kg				IEC/EN 60034									

Environmental conditions : °C - +40 °C / m

Mechanical data

Sound level (SPL / SWL) at 50Hz|60Hz	/ dB(A) | / dB(A)	Insulation	155(F) to 130(B)
Moment of inertia	0.0440 kg m²	Duty type	S1 = continuous operation
Bearing DE | NDE	6309 2ZC3 |	Direction of rotation	bidirectional
Lubricants	Esso Unirex N3	Frame material	aluminum
Regreasing device	40000	Net weight of the motor (IM B3)	62 kg
Type of bearing	Locating bearing NDE	Color, paint shade	RAL7030
Condensate drainage holes	No	Motor protection	(B) 3 PTC thermistors - for tripping (2 terminals)
External earthing terminal	No	Method of cooling	IC 411
Vibration severity grade	A (standard)		

Terminal box

Terminal box position	Terminal box - at the top	Max. cross-sectional area	16.0 mm²
Material of terminal box	Aluminium	Cable diameter from ... to ...	19 mm - 28 mm
Type of terminal box	TB1 J00	Cable entry	2xM40x1,5-1xM16x1,5
Contact screw thread	M5	Cable gland	3 plugs

Notes:

I_A/I_k = locked rotor current / current nominal
M_A/M_k = locked rotor torque / torque nominal
M_K/M_k = break down torque / nominal torque

1) L10mh according to DIN ISO 281 10/2010
2) at rated power / at full load

3) Value is valid only for DOL operation with motor design IC411

responsible dep.	technical reference	created by	approved by	
DI MC LVM		DT Configurator		*Technical data are subject to change! There may be discrepancies between calculated and rating plate values.*

SIEMENS

document type	document status	customer
datasheet	released	

title	document number			
1LE1011-1DJ23-4GB4-Z B02+H23+M11+Q02		rev.	creation date	language / Page
		01	2020-12-17 17:02	en / 1/2

Data sheet for three-phase Squirrel-Cage-Motors SIMOTICS

Motor type : 1AV1162J **- 160 M - (G) IM V1 / IM3011 - p**

Special design

B02	Acceptance test certificate 3.1 acc. to EN 10204	M11	Stainless steel rating plate
H23	Radial sealing ring at the DE for flange types of construction, oil-tight up to 0.1 bar	Q02	Anti-condensation heating for 230 V (2 terminals)

Notes:

responsible dep.	technical reference	created by	approved by	
DI MC LVM		DT Configurator		*Technical data are subject to change! There may be discrepancies between calculated and rating plate values.*

SIEMENS	document type: datasheet		document status: released	customer	
	title: 1LE1011-1DJ23-4GB4-Z		document number		
	B02+H23+M11+Q02		rev.: 01	creation date: 2020-12-17 17:02	language: en / Page: 2/2

ČLÁNEK I. – POPTÁVKOVÉ PODKLADY

1.1 E-mail _ Martin TG1 - ZO + KUP ze 12.2.2025 a připomínek ze 27.2.2025 (dále pak "POPTÁVKA")

1.2 Předaná poptávková dokumentace (dále pak "PODKLADY")

ČLÁNEK II. – PŘEDMĚT NABÍDKY

2.1 DHE

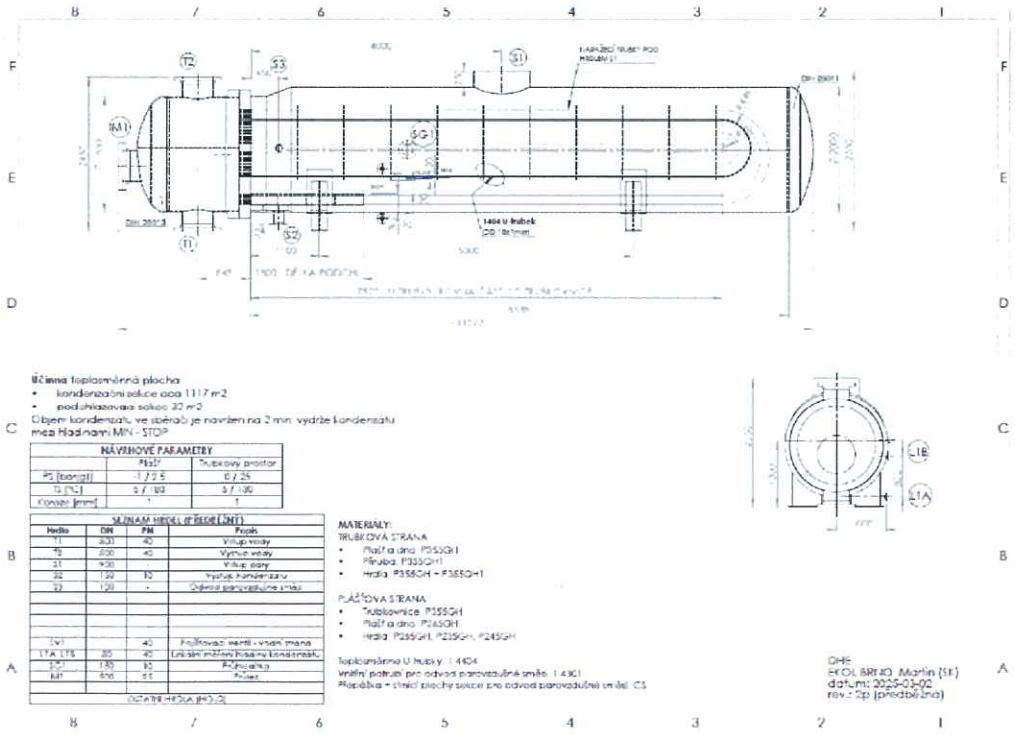
1117m2 kondenzační sekce + 32m2 podchlazovací sekce, D1850/2000mm, l=cca11077mm, v=2550mm (od patek k hrdlu vstupu páry S1), cca 26,9t

Plášť: -1/+2,5bar(g); 5/180°C

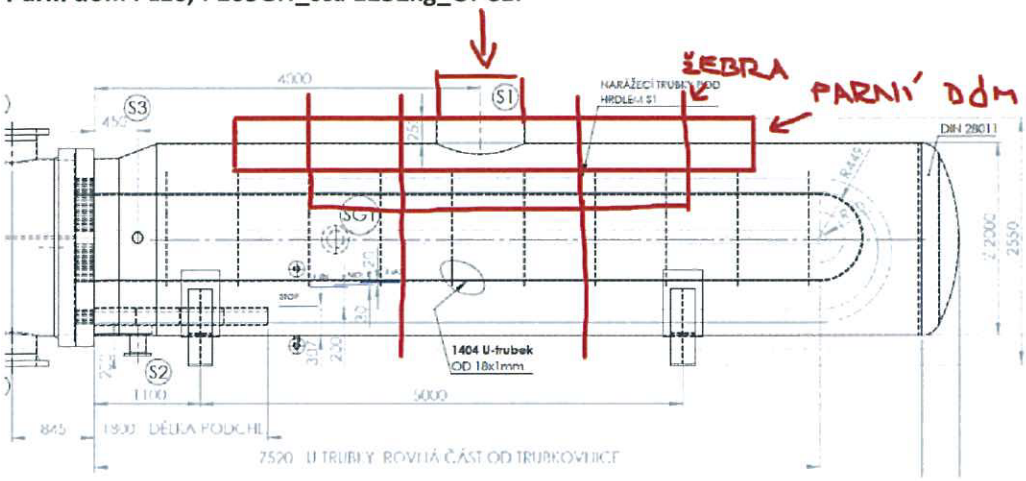
Trubkový prostor: 0/25bar(g); 5/130°C

District Heater - horizontální výměník s podchlazovací sekcí **32m2 a** teplosměnnou plochou **1117m2,** pára-voda, tvořenou U trubkami. Vodní komora s klenutým dnem je spojena s trubkovnicí šroubovým spojem . Dle pevnostního výpočtu kompenzátor na plášti není aplikován. Plášť ohříváku je celosvařovaný s přivařenou trubkovnicí, vstup páry je umístěn shora na plášti, výstup kondenzátu je umístěn v dolní části pláště. Teplosměnná plocha je kondenzační a je tvořena nerezovými podélně svařovanými teplosměnnými U trubkami. Teplosměnné trubky SS jsou do CS trubkovnice zaválcovány. Čištění rovných částí U trubek je možné mechanicky, po sejmutí vodní komory nebo profouknutím Utrubek kuličkami, které se používají při kontinuálním čištění. Výměník je opatřen odnímatelnou vstupní/výstupní vodní komorou jejíž vnitřní povrchy nejsou opatřeny nátěrem. Ohřívák je opatřen dvěma patkami pro upevnění na OK. Vnější povrch ohříváku je opatřen finálním nátěrem pod izolaci.

Parní dóm je nabízen jako OPCE.



Parní dóm PL10, P265GH_cca 1232kg_OPCE:



Hlavní materiál:

Klenuté dno parního prstoru OD 2000x8mm, P265GH
Klenuté dno VK OD 1850x20mm, P355GH
Plášť vodních komor D1850mm, pl 16mm, P355GH
Plášť parního prostoru D2000 pl 10, P265GH
Podpěrné stěny D1900mm(10ks), pl 10mm, S235JR
Trubkovnice OD 2050x 195mm (final machined dimension) P355GH

U trubky podélně svařované dle, EN 10217 – 7/TC2/W2Rb, OD18x1x7910mm (rovná funkční část), mat. 1.4404 + AT (CrNiMo17-12-2), 1404ks,
Spoj trubka-trubkovnice zaválcováno
Nejsou známé restrikce na zemi původu materiálů.

NÁVRHOVÉ PARAMETRY		
	Plášť	Trubkový prostor
PS [bar(g)]	-1 / 2.5	0 / 25
TS [°C]	5 / 180	5 / 130
Koroze [mm]	1	1

Poznámky k DHE, prev. 1:
U hrdla vstupu páry uvažujte prosím se parním dómem pro lepší rozdistribuování páry (v souladu s komentářem EKOLu).

Aktualizované parametry výměníku jsou:

		DHE				
Stav		LP1	LP2	LP3	LP4	LP5
Water mass flow	t/h	913	1226	1103	701	323
Water inlet temperature	°C	55.00	80.00	71.00	53.00	55.00
Water outlet temperature	°C	94.32	109.85	98.80	79.74	74.94
Pressure loss in the tubeside	bar	0.15	0.25	0.21	0.09	0.03
Steam inlet pressure	bar(a)	0.93	1.63	1.09	0.50	0.42
Steam inlet enthalpy	kJ/kg	2571.5	2639.8	2593.9	2548.2	2683.2
Max. final temp. difference	°C	3.21	4.02	3.10	1.78	1.81
DCA (drain cooler appr.)	°C	21.25	14.99	13.09	11.04	4.76
Heatduty	MW	41.77	42.77	35.75	21.78	7.48
Steam consumption	t/h	67.14	69.05	57.74	34.60	11.12

DHE
Cleanliness factor = 0.9.

Výstroj:

1x lokální měření tlaku na vodní straně
1x pojistný ventil na vodní straně(dodavatel ARI)-viz specifikace níže
návarky pro měření hladiny kondenzátu na sběrači

DHE
Safety Valve - Water Side

Number of Pieces	1
Safety Valve Type	ARI type 35.901
Inlet	DN40PN40 (EN 1092-1)
Outlet	DN65 PN16 (EN 1092-1)
Fluid	Water
Setting Pressure	25bar g
Max. pressure / temperature	25bar g / 130°C
Nameplate with KKS Code	0
Surrounding	without explosure danger
Material certificate	EN 10204-3.1
Documentation Language in Setting certificate	English and Czech

Povrchová úprava:
Materiál CS - vnější povrchy pískování na Sa 2 ½ , základní nátěr a vrchní nátěr
vnitřní povrchy parního prostoru-konzervace
vnitřní povrch vodních komor-konzervace

Standardy: design a výroba dle EN 13445, PED 2014/68/EU+IT plan, EN1092-1.

Turbine Datasheet
ETP4-016-3314-2

12.05.2025

Typ:
Turbina EST 40C

Projekt:
Martin-Nová turbína TG1

Nabídka č.:
Na 25-065009

Otáčky turbíny n_T = 9 000 rpm

Otáčky generátoru n_G = 1 500 rpm

			PB1	PB2	PB3	PB4
Vstupní pára						
Průtok páry - celkově	$m_{0,celk}$	[t/h]	72.67	71.58	61.52	38.86
Průtok páry do paroproudé vývěvy	$m_{0,PPV}$	[t/h]	0.05	0.00	0.00	0.05
Průtok páry do turbíny	m_0	[t/h]	72.62	71.58	61.52	38.81
Tlak	p_0	[bar_a]	57.0	57.0	57.0	57.0
Teplota	t_0	[°C]	450.0	450.0	450.0	450.0
Entalpie	h_0	[kJ/kg]	3307.1	3307.1	3307.1	3307.1
Neregulovaný odběr - Odplyňovák						
Průtok páry	m_e	[t/h]	4.60	2.39	3.38	3.88
Tlak	p_e	[bar_a]	6.14	6.34	5.21	3.07
Teplota	t_e	[°C]	244.7	290.4	236.4	193.0
Entalpie	h_e	[kJ/kg]	2946.0	3041.2	2931.9	2851.1
Teplota odplynění	t_{ODPL}	[°C]	105.0	105.0	105.0	105.0
Výstup z turbíny						
Průtok páry	m_2	[t/h]	67.90	69.05	58.03	34.88
Tlak	p_2	[bar_a]	0.965	1.655	1.104	0.512
Teplota	t_{2C}	[°C]	98.6	114.3	102.4	81.9
Celková entalpie	h_{2C}	[kJ/kg]	2573.0	2640.0	2585.1	2537.1
Elektrický výkon	P_{el}	[kW]	**13 580**	**12 280**	**11 325**	**7 420**
Účiník	cosφ	[-]	0.80	0.80	0.80	0.80
Topný ohřívák						
Vstupní teplota topné vody	$t_{tv,1}$	[°C]	55.0	80.0	71.0	53.0
Výstupní teplota topné vody	$t_{tv,2}$	[°C]	95.0	110.0	99.0	80.0
Průtok topné vody	m_{tv}	[t/h]	913	1226	1103	701
Tepelný výkon	P_{tep}	[MW_t]	**42.5**	**43.0**	**36.0**	**22.0**
Teplárenský index	Ti	[-]	0.319	0.286	0.315	0.337
Doplňovací voda z CHÚV						
Průtok vody	m_{dopl}	[t/h]	10.0	10.0	10.0	10.0
Teplota vody	t_{dopl}	[°C]	25.0	25.0	25.0	25.0

Termodynamické vlastnosti vody a vodní páry: IAPWS IF-97